966173/2021/swm.Br

Haryana State Pollution Control Board
Haryana State Pollution Control Board
C-11, Sector-6, Panchkula
Website – www.hspcb.gov.in E-Mail - hspcb.ho@gmail.com
Tele No. – 0172-2577870-73

No. HSPCB/2021/ 952-A **Dated:** - 27.07.2021

To

The Director General,
Information, Public Relations
& Cultural Affairs Department,
Haryana, Chandigarh.

Sub: Public hearing for proposed setup Integrated Municipal Solid Waste Processing Facility (IMSWM) with proposed expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW capacity at Village Bandhwari Tehsil & District, Gurugram..

I have been directed to enclose herewith an advertisement notice regarding Public Hearing to be held on 31.08.2021 at 11:00 AM. of **Integrated Municipal Solid Waste Processing Facility (IMSWM) with proposed expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW capacity at Village Bandhwari Tehsil & District, Gurugram at the site** for publication in the following leading newspapers on DAVP rates:-

1. One English News paper published from Chandigarh.
2. One English News paper widely circulated in District- Gurugram, Haryana.
3. Two Hindi News paper widely circulated in District- Gurugram, Haryana.

This advertisement should appear on or before 29.07.2021 in the above said newspapers only and bills of above newspapers on DAVP rates may be sent to this office at the earliest, the bill payment of above said notice will be made for above newspapers only.

DA/Advertisement

27/7/2021

Sr. Environmental Engineer (HQ)
For Member Secretary

Endst. No. HSPCB/2021 953-56 **Dated:** 27.07.2021

A copy of the above is forwarded to the following for information and necessary action:-

1. Deputy Commissioner, Gurugram
2. The Chairman, Zila Parishad, District, Gurugram
3. Municipal Corporation District, Gurugram for display on Notice Board.
4. General Manager, District Industries Centre, District Gurugram

DA/Advertisement.

27/7/2021

Sr. Environmental Engineer (HQ)
For Member Secretary

Endst. No. No. HSPCB/2021/ 957-59 **Dated:** 27.07.2021

A copy of the above is forwarded to the following:

1. Regional Officer, Haryana State Pollution Control Board, Vikas Sadan, Opposite- New Court, Gurugram along-with copy of EIA report and Executive Summary and CD for sending the same to the concerned authorities mentioned above to place the same in their offices for consultation of the general public during office hours.
2. Integrated Municipal Solid Waste Processing Facility (IMSWM) with proposed expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW capacity at Village Bandhwari Tehsil & District, Gurugram.
3. Nodal Officer, HSPCB (Website) to upload the public notice on website of the Board.

DA/Advertisement.

27/7/2021

Sr. Environmental Engineer (HQ)
For Member Secretary

Endst. No. HSPCB/2021/ 960-62 **Dated:** 27.07.2021

A copy of the above is forwarded to the following for information please:-

1. The Additional Chief Secretary to Govt. Haryana, Environment Department, Chandigarh.
2. The Director General, Environment Department, Haryana.
3. PS to Chairman / PA to Member Secretary.

DA/Advertisement

27/7/2021

Sr. Environmental Engineer (HQ)
For Member Secretary

966173/2021/swm.Br

HARYANA STATE POLLUTION CONTROL BOARD
C-11, SECTOR-6, PANCHKULA
Website – www.hspcb.gov.in E-Mail - hspcbho@gmail.com
Tele Fax No. – 0172-2577870-73

Notice For Public Hearing

It is for the information of all concerned that **Municipal Corporation, Gurugram has proposed to setup Integrated Municipal Solid Waste Processing Facility (IMSWM) with a proposed expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW capacity at Village Bandhwari Tehsil & District, Gurugram.** This project is covered under the ambit of Environment Impact Assessment Notification dated 14 Sep 2006 issued by the Ministry of Environment, Forest and Climate Change Department, Government of India, and thus is required to obtain Environmental Clearance. The details of unit/project and date, time & venue of Public Hearing are given as under.

Sr. No.	Name of the Unit	Date of Public Hearing	Time of Public Hearing	Venue of Public Hearing
1.	M/s Municipal Corporation, Gurugram for setting up Integrated Municipal Solid Waste Processing Facility (IMSWM) with proposed expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW capacity at Village Bandhwari Tehsil & District, Gurugram	31.08.2021	11.00 A.M	At Site

As a part of procedure for seeking the Environmental clearance, notified by the Ministry of Environment, Forest & Climate Change Department, Govt. of India, New Delhi vide Notification No. S.O. 1533 (E), dated 14.9.06, the project proponent mentioned above have applied to the Haryana State Pollution Control Board, **for conducting a Public Hearing so as to obtain views, suggestions and objection, if any, of the nearby Public on the proposed project. Copies of executive summary of the project and EIA study report, submitted by the project proponent, are available in the following offices, which can be perused during office hours,** on any working day : -

1. Deputy Commissioner, Gurugram.
2. Regional Officer, Haryana State Pollution Control Board, Vikash Sadan, Gurugram.
3. O/o Zila Parishad, Gurugram.
4. O/o Municipal Corporation, Gurugram.
5. Website of HSPCB (hspcb.gov.in)

Notice is hereby given to all concerned, to file suggestions, views, comments and objections, if any, on the proposed project, to the Chairman, Haryana State Pollution Control Board, C-11, Sector -6, Panchkula as well as Regional Officer, Haryana State Pollution Control Board, Vikas Sadan, Gurugram within 30 days. Besides, Public Hearing also will be held on the date, time & Venue mentioned above **at the proposed site** of the project, which can be attended by any person including bona fide residents, environmental groups and others located at the project site / sites of displacement / sites likely to be affected. Oral/written suggestion, if any, will be admissible while attending the Public Hearing.

No TA/DA will be admissible for attending the Public Hearing.

(S. Narayanan, IFS)
Member Secretary

KEEP HARYANA CLEAN AND POLLUTION FREE

966136/2021/swm.Br

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT
&
ENVIRONMENTAL MANAGEMENT PLAN
FOR
ENVIRONMENT CLEARANCE

(Under Clause 6 of S.O.1533 of EIA Notification, 2006 & its subsequent amendments)

PROPOSED EXPANSION OF WASTE TO ENERGY (WTE) PLANT FROM 15 MW TO 25 MW AT INTEGRATED MUNICIPAL SOLID WASTE MANAGEMENT (IMSWM) PROCESSING FACILITY AT BANDHWARI VILLAGE, DIST. GURUGRAM, HARYANA

AREA - 30.5 ACRES

PROPOSED EXPANSION - 25MW WTE PLANT

Category of the project- "A" Project schedule 1(d)

(Proposed Capacity of WTE is 25 MW & Interstate Boundary of Haryana and Delhi is at distance about 0.98 km from the site)

PURPOSE – ENVIRONMENT CLEARANCE FOR EXPANSION OF WTE PLANT

PROJECT COST- 617.01 CRORE

STUDY PERIOD-OCTOBER 2020 TO DECEMBER 2020

March, 2021

APPLICANT

MCG MUNICIPAL CORPORATION of GURUGRAM
NURTURING GURUGRAM

Municipal Corporation of Gurugram
C-1, Info city, Sector- 34,
Gurugram-122004

LIST OF ABBREVIATIONS

AAQ	Ambient Air Quality
AMSL	Above Mean Sea Level
ADS	Air Density Separator / De-stoner
A & O	Anoxic & Oxic
Bgl	Below Ground Level
BOD	Biochemical Oxygen Demand
CCA	Conventional Cost Accounting
COD	Chemical Oxygen Demand
CMWMF	Common Municipal Waste Management Facilities
CPHEEO	Central Public Health and Environmental Engineering Organization
CSI	City Sanitary Inspector
CSR	Corporate Social Responsibility
CER	Corporate Environmental Responsibility
D2D	Door-to-door
CPCB	Central Pollution Control Board
dB	Decibel
DO	Dissolved Oxygen
DPCC	Delhi Pollution Control Committee
EAC	Expert Appraisal Committee
EIA	Environmental Impact Assessment
ETP	Effluent Treatment Plant
EMC	Environmental Management Cell
EMP	Environment Management Plan
EPA	The Environment Protection Act
GLC	Ground Level Concentration
GOI	Government Of India
GIS	Geographic Information System
Ha	Hectare
HH	Households
HDPE	High-Density Polyethylene
HMV	Heavy Motor Vehicle
HFL	High Flood Level
HSPCB	Haryana State Pollution Control Board
HW	Hazardous Waste
IMD	Indian Meteorological Department
IS	Indian Standards
IMSWM	Integrated Municipal Solid Waste Management
JIR	Joint Inspection Report
KLD	Kilo litre Per Day
Km	Kilo Meter
Leq	Equivalent Noise Level
LFL	Low Flood Level
LCS	Leachate Collection System

LDPE	Low-density polyethylene
LHV	Low Heating Value
LOS	Level of Service
LTP	Leachate Treatment Plant
LoI	Letter of Intent
MoEF&CC	Ministry of Environment, Forest & Climate Change
MSW (M&H)	Municipal Solid Waste (Management and Handling)
MCG	Municipal Corporation Gurugram
MT	Metric tone
O&M	Operation and Maintenance
NABET	National Accreditation Board for Education and Training
NH	National Highway
NF	Nano Filtration
NOC	No Objection Certificate
OSHA	Occupational Safety and Health Administration
PCU	Passenger Car Unit
PFR	Pre- feasibility Report
PF/RF	Protected Forest/Reserve Forest
$PM_{10/2.5}$	Particulate Matter
PP	Project Proponent
PPE	Personal Protective Equipment
QCI	Quality Council of India
RL	Reduced Level
R & R Plan	Resettlement & Rehabilitation plan
RDF	Refuse Derived Fuel
SH	State Highway
SLF	Sanitary Landfill Facility
SS	Street Sweeping
STP	Sewage Treatment Plant
SPCB	State Pollution Control Board
SHW	Solid Hazardous Waste
ToR	Terms of Reference
TPD	Tonnes Per Day
TPA	Tonnes Per Annum
UF	Ultra Filtration
USEPA	United State Environmental Protection Agency
ULB	Urban Local Body
WPLF	Waste Processing & Landfill
WTE	Waste to Energy
N	North
E	East
W	West
S	South

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Name of Project: Proposed Expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW at Integrated Municipal Solid Waste Management (IMSWM) Processing Facility at Bandhwari Village, Dist. Gurugram, Haryana.

1. Introduction

The proposed project is for expansion of waste to Energy (WTE) plant from 15 MW to 25 MW at integrated municipal solid waste management facility at Bandwari village, Gurugram, Haryana State (2100 TPD Capacity). MCG proposes to enhance the waste processing & disposal services by expanding the Capacity of existing 15 MW Waste to Energy Plant to 25 MW Waste to Energy Plant along with RDF Plant- 1500 TPD, Composting Facility- 210 TPD and Sanitary landfill area- 24680 sqm within the existing MSW Facility.

2. Identification of Project & Project Proponent

Municipal Corporation Gurugram (MCG) are proposing for expansion of WTE plant from 15 MW to 25 MW in IMSWM facility at Bandhwari is categorized under Item "1(d) Thermal Power Plants- Waste to Energy (WTE)" as per EIA Notification, dated September 14, 2006 and its subsequent amendments and all electricity generating units of capacity > 20 MW (using municipal solid non-hazardous waste as fuel) will be treated as category-A project will require Environmental Clearance from MoEF&CC.

The proposed project of Integrated Municipal Solid Waste Management (IMSWM) Processing Facility with Waste to Energy (WTE) plant of 25 MW capacity is interlinked to sector - 7(i) Common Municipal Solid Waste Management Facility (CMSWMF) and sector- 1(d) Thermal Power Plants- Waste to Energy (WTE) as per EIA Notification 2006 & its subsequent amendments.

Application for Terms of Reference (ToR) was applied and proposal was recommended by EAC (Thermal Power Projects) in its meeting on dt: 28.07.2020 and granted ToR vide F.no. J-13012/08/2020 –IA.I (T) on dt: 16.09.2020 for further conducting EIA/EMP study for the proposed expansion.

3. Project Details

The IMSWM facility along with expanded capacity of WTE (25 MW) is spread over an area of 30.5 acres in Bandhwari Village. Brief of project details with environment setting, location details, resources requirements for project and project cost are given below:

<table>
<tr><th>Sr.No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td>A.</td><td>Nature of the Project</td><td>Integrated Municipal Solid Waste Management (IMSWM) Processing Facility with proposed expansion of Waste to Energy (WTE) Plant from 15 MW to 25 MW capacity.</td></tr>
<tr><td>B.</td><td colspan="2">Size of the Project</td></tr>
<tr><td></td><td>Existing & Proposed Capacity</td><td>Waste quantity: 1165 TPD in 2015, 1565 TPD in 2025 & estimated waste quantity in 2035 will be 2100 TPD (as per 2011 census)
IMSWM-WTE Project Area - 30.5 Acres

<table>
<tr><th>Project Activity/ Components</th><th>As per EC awarded</th><th>Proposed expansion</th></tr>
<tr><td>Total capacity of facility</td><td>2100 TPD</td><td>NIL</td></tr>
<tr><td>RDF plant</td><td>1500 TPD</td><td>NIL</td></tr>
<tr><td>Composting</td><td>147 TPD</td><td>210 TPD</td></tr>
<tr><td>Area for SLF</td><td colspan="2">24680 Sqm</td></tr>
<tr><td>Waste to Energy (RDF based)</td><td>15 MW</td><td>25 MW</td></tr>
</table>

Therefore, the following are proposed for expansion in WTE plant:
• Proposed expansion to 25 MW
• Mechanical Grate type Boilers: 2 No. (750 TPD/each)
• Steam Turbine Generator: 1 no. 25 MW
• Bag Filters System</td></tr>
<tr><td>2.</td><td>Composting</td><td>210 TPD</td></tr>
<tr><td>3.</td><td>RDF Plant</td><td>1500 TPD</td></tr>
<tr><td>4.</td><td>Sanitary Landfill</td><td>Area: 24680 Sqm,</td></tr>
<tr><td>5.</td><td>Waste to Energy (WTE) Plant</td><td>25 MW</td></tr>
</table>

Sr.No.	Particulars	Details
6	Fuel Supply & Availability for Proposed WTE of 25 MW	Municipal Solid Waste (MSW) shall be processed to make RDF/ Combustible material further to use as fuel for Power generation.
C	**Location Details**	
1.	Plot no./Kasra no.	46//5/26,15,16,17/1,24/1,24/2,25, 47//8,9,10,11,12,13,18,19,20,21,22,23, 48//1,2,9,10,11,49//3/3,4,5,7,8/1,13/2,14,15
2.	Latitude & Longitude of Project site	A. 28°24'14.89"N 77°10'16.86"E B. 28°24'13.13"N 77°10'27.39"E C. 28°24'01.35"N 77°10'18.83"E D. 28°24'02.72"N 77°10'11.54"E
3.	Topo sheet No.	53H/3, 53H/7
4.	Village	Bandhwari
5.	Tehsil	Gurugram
6.	District	Gurugram
7.	State	Haryana
D	**Environmental Settings of the Area**	
1.	Ecological Sensitive Areas	Asola Wildlife Sanctuary boundary exists at 300 m in NE direction from the project site and is beyond Eco Sensitive Zone (ESZ) of Asola WLS which is 150 m at ID P-9 & P-10 points (nearest points to site) as per MoEF&CC notification no. 5.0.1911 (E) dated 31st May 2019 in reference of Asola Bhatti Wildlife Sanctuary. NOC & Clarification letter regarding the same has been obtained.
2.	River / water body	

River/ water body	Distance	Direction
Jauhar Nala	1.14 km	SE
Lake Shail	2.25	SE
Water body near village Gothda Mohbtabad	3.73	SSE
Li Nala	3.72 km	NW
Sharpur Nala	5.92 km	NNE
Paliwala Nala	6.22 km	E
Harcliandpur Distributary	6.72 km	SE
Lake Niharika	7.81	E

Sr.No.	Particulars	Details
		Nekpur Miner – 8.41 km – ESE Bhiruya Nala – 9.35 km – ENE Fatehpur Miner – 9.86 km – SSE Barkhal Lack – 9.70 km – E
3.	Nearest Town / City	Gurugram- 6.44 Km; Faridabad – 9.67 Km
4.	Nearest Railway Station	Faridabad Railway Station at 13.7 km in East Direction
5.	Nearest Airport	Indira Gandhi International Airport at 18.10 km in NNW Direction. NOC from Airports Authority of India has been obtained through vide letter no. AAI/RHR/NR/ATM/NOC/2018/288/1517-1520 dated: 04.09.2018.
6.	State Boundary	Interstate Boundary of Haryana and Delhi lies at 0.98 km from the site
7.	Seismic Zone	Zone – IV [as per IS 1893 (Part-I): 2002]
E	**Cost Details**	
1.	Total Project Cost	61700.92 Lakhs
F	**Requirements of the Project**	
1.	Water Requirement	Construction Phase: 8 -10 KLD Source: Municipal Corporation of Gurgaon Operation Phase: 792 KLD (for MSW Processing & WTE plant) + 12 KLD (for Domestic) Source: Nearby STP approved by GMDA and drinking water, separately through MCG approved water tankers. Approval from GMDA to receive 4 MLD reclaimed water from STP for the project operation was obtained Memo no. GMDA/S&S/2018/579 on 24.05.2018.
2.	Power Requirement	Construction Phase: 675 KW (backed up through 630 KVA DG set.) Operation Phase: auxiliary supply from proposed waste to energy plant (backup through 1500 KVA DG set)
3.	Manpower requirement	Construction Phase: Around 600 workers Operation Phase: 2100 (Including manpower required for Waste collection & Transportation)

4. Baseline Environmental Studies

Field studies were carried out to establish the existing environmental status (air, water, noise, soil, and ecology) and prevailing socio-economic conditions. A study area of 10 km radius from the project site was identified to establish the present environmental and socio-economic conditions. The baseline studies were carried out during the post monsoon season October 2020 to December 2020.

During the study period, wind direction was predominantly recorded from NW closely followed by W. Calm condition prevailed for 0.27% of the total time and the average wind speed for the season is 3.40 m/s.

Ambient Air Quality

Ambient Air Quality samplers were installed at 8 different locations for estimating the particulate and gaseous pollutants. The monitoring locations were selected in downwind, cross wind and upwind direction of the existing project location. At each location, monitoring was carried out at a frequency of 2 days per week for 12 weeks during the study period, as per the NAAQM guidelines.

PM2.5 levels were recorded in the range of 98.04-144.23 µg/m^3 while PM10 levels were in the range of 154.42-354.37 µg/m^3. SO_2 concentrations were in the range of 12.69-19.99 µg/m^3 and NOx concentrations were in the range of 27.29-74.09 µg/m^3. Ammonia concentrations were in the range of 24.81-69.92 µg/m^3 and Ozone concentrations were in the range of 8.81-49.13 µg/m^3. CO levels were in the range of 1.09 to 2.06 mg/m3..

The observed concentrations were compared with CPCB standards (National Ambient Air Quality Standards, 2009) It is observed that the monitored parameters are within the permissible limits as per NAAQS, 2009 during the study period except PM10 & PM2.5 which were very high due to the continuous practice of stubbles burning in nearby villages in Haryana as well as Delhi.

Water Quality Monitoring

A total of 8 ground water and 3 surface water samples were collected from different sources within the study area and analyzed for all important physico-chemical Characteristics to establish the quality of water prevailing in the project surroundings.

The ground water samples were drawn from the hand pumps and bore wells used by the villagers for their domestic needs. Surface water samples were taken from the Lake & Pond in the study area.

It is identified that the pH values of ground water were in the range of 6.58 to 7.27, while pH values of surface water were in the range of 6.85 to 7.79. The TDS values of ground water were in the range of 464 mg/l to 2988 mg/l, while the TDS values of surface water were in the range of 274 to 326 mg/l. Chloride concentrations of ground water were in the range of 48 mg/l to 1085 mg/l, while surface water values were in the range of 26 to 64 mg/l. The hardness of ground water was in the range of 276 mg/l to 1120 mg/l, while hardness of surface water was in the range of 116 to 180 mg/l.

Noise Monitoring

Noise levels were monitored at 8 locations within the study area, using a continuous noise measurement device. The day levels of noise have been monitored during 6 AM to 10 PM and the night levels during 10 PM to 6 AM. The day equivalent values during the study period were in the range of 46.6 to 56.1 dB(A) while the night equivalents were in the range of 35.2 to 40.6 dB (A). From the results it can be seen that the day equivalent values and the night equivalent values were within the ambient noise standards of residential area.

Soil Quality

A total of 8 soil samples were collected from different locations within the study area. The sampling locations were selected to assess the existing soil conditions representing various land use conditions and geological features. From the analysis of soil samples, it is found that in the study area, the pH values varied from 6.89 to 7.54, the organic carbon varies from 0.14 to 0.69 %, the available Nitrogen from 144.9 to 340.2 kg/ha, the available Phosphorus varies from 32.25 to 85.08 kg/ha and the available Potassium from 126.92 to 179.55 kg/ha.

Ecological Environment

The biological study of the area has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment. Asola Wildlife Sanctuary is situated to 300 m NE direction from the project site.

NOC from the Principal Chief Conservator of Forest and Chief Wildlife Warden, Haryana was obtained vide letter no. 992 on dated: 09/07/19 certifying that the project is outside the defined Eco-sensitive zone of the Asola Bhatti Wildlife Sanctuary as per Notification dated: 31.05.2019. Hence, clearance from NBWL is not applicable for the project. A detailed site specific conservation plan & wildlife management plan was prepared and approved by Principal Chief Conservator of Forest & Chief Wildlife Warden, Haryana vide letter no. 992 dated: 09/07/19

Socio – Economic Environment

Total population of the study area is 153342 persons. Out of which 82571 (53.8%) are male and 70771 (46.2%) are female. SC total population is 21848 out of which 11656 (53.4%) are male and 10192 (46.6%) are female.

Literacy Rate is the amount of people in a country with the ability to read and write. The analysis of the literacy levels is done in the study area. Literacy in any region is key for socio-economic progress and the Indian literacy rate grew to 74.04% in 2011 from 12% at the end of British rule in 1947. Although this was a greater than six fold improvement, the level is well below the world average literacy rate of 84% and of all nations.

5. Anticipated Environmental Impacts and Mitigation Measures

The potential impacts on the environment from the proposed project are identified based on the nature of various activities associated with the project implementation and project operations (impacts during construction phase and operation phase).

Impacts during Construction Phase

Construction phase works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The impacts due to construction activities are short term and are limited to the construction phase. The impacts will be mainly on air quality, water quality, soil quality and socio-economics. All necessary control measures will be taken to minimize the impacts. As the project site is already in operation and well maintained by leveling and developed with thick green belt, there will not be any impact of dust or other pollution due to the proposed activities.

Impacts during Operations Phase

During the operation phase of the proposed project there would be impacts on the air, water and land environment and socio-economic aspects.

Impact on Air Quality

The main sources of air pollution include point source emissions from incinerator and DG sets as well as emissions from landfill operations. For estimation of post project scenario, maximum Ground Level Concentrations (GLC) of 24- hour average for Particulate Matter (PM), SO2 and NOx were predicted and superimposed on the corresponding maximum baseline concentrations. The overall scenario with predicted concentrations over the maximum baseline concentrations of PM10 – 354.88 µg/m3, SO2 – 20.64 µg/m3, NOX – 76.7 µg/m3.

Incinerator will be equipped with all necessary Flue Gas Cleaning/Purification System (FGCS) including spray drier, SNCR system, cyclone, scrubber, bag filter etc. to comply with emission standards. Also incinerator will be provided with a 60m stack height. The emissions from DG sets will be minimal since they will be operated only during power failure. All the vehicles will be regularly serviced and maintained properly to minimize emissions. All the internal roads will be maintained properly to minimize dust generation. Proper tree plantation/green cover will be maintained around the project boundary.

Impact on Water Quality

During operational phase, there is a potential threat for the contamination of ground water due to the generation of leachates particularly during rains when the surface runoff infiltrate down the surface of finished and the operational cells of the landfills. Sewage generated from domestic activities of workers at the site can be potential source of ground water contamination if not managed properly. As per the management plan the ground water quality shall be monitored at regular intervals in the operational phase of the project to check for contamination.

Impact on Land Environment

During the operation phase of the project, the soil may get polluted/contaminated from littering of various kinds of municipal wastes, leakage of leachates and due to fly ash or bottom ash. No significant impact is expected on the top soils on and around the site. It is imperative to establish a well-planned solid waste collection, storage and segregation system management at site. Only covered trucks will be allowed to enter the site for unloading of municipal solid waste materials, good housing keeping will help to control the contamination of soil.

Impact on Ecology

A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary, odour management and provide habitat to small birds and mammals; No activities shall be planned in the green buffer other than approach/ service road. Employees should be aware about wild animals. No illegal hunting and poaching activities to be allowed in the study area;

Impact on Socio Economics

The proposed facility is likely to provide direct and indirect employment and likely to increase the socio-economic status of the nearby villages in the study area. Due to the proposed project the facilities for public transport, water supply, telecommunications, education, public health etc. are likely to improve. The proposed facility provides good waste handling practices which will greatly reduce foul smell and reduce impact from

odors, thus avoiding environmental damage due to unorganized disposal. The habitats in the surrounding industrial estates are greatly benefited in terms of health status and economy.

6. Environment Monitoring Program

The major construction activities involved in setting up the expansion unit are construction of sheds for treatment units, stores, etc. major components in the proposed plant are landfill, waste to energy plant, diesel generator, FGCS, LTP cathode ray tube cutter and other civil, mechanical and electrical equipment. The construction activities require preparation of site, remediation of existing old dump, mobilization of construction material and equipment. The construction activities are expected to last for few months.

During construction phase of landfill and WTE at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers, leachate collection system, FGCS, storm water management system, gas vent systems, etc

Environmental Monitoring Program includes: (i) continuous online monitoring of the incinerator stack emission for flue gas parameters, (ii) incinerator stack emission monitoring to ensure compliance with emission standards, (iii) periodic analysis of water from monitoring borewells, (iv) ambient air quality monitoring, (v) analysis of treated wastewater, especially in case of discharge, (vi) periodic monitoring of incineration ash and sludge etc., (vii) other parameters as prescribed in Consent to Operation (CTO) etc.

7. Environment Management Plan

The Environmental Management Plan (EMP) is required to ensure sustainable development in the area of the proposed project site. Hence, it needs proper Environmental Management Plan (EMP) to meet these objectives. The purpose of the Environmental Management Plan is to minimize the potential environmental impacts from the project and to mitigate the adverse impacts. . Minimum 33% of the total plot area shall be developed as greenbelt as per CPCB guidelines. The budget allocated for implementation of EMP is Rs 2870 lakhs with a recurring cost of Rs. 286 lakhs per

annum. The total project cost including proposed expansion is Rs. 617.01 Cr which includes cost for IMSWM –WTE (15 MW) - 330.48 Cr and cost for proposed expansion of WTE to 25 MW- 286.53 Cr, i.e Rs 286.53 + 330.48 = 617.01Cr.

8. Project Benefits

The proposed project will have direct and indirect economic benefits in form of employment, development of ancillaries, establishment of service facilities, development of telecom and transportation facilities. The compost production from IMSWM would add to the revenue of state as per CCA and compost shall also enhance the crop productivity and improvement in the soil texture and enhancement of soil nutrients resulting increase in fertility of soil. The compost produced from the composting pads can be used as soil conditioner that improves soil quality. This compost has the ability to help regenerate poor soil by increasing nutrient content in soil and retain moisture.

The following benefits are being envisioned:-

- Use of compost produced as manure to the crops.
- Generation of revenue through the sale of compost produced from the MSW processing and disposal facility.

9. Conclusion

The EIA study has made an overall assessment of the potential environmental impacts likely to arise from the proposed Expansion of WtE plant (from 15 MW to 25 MW) setting up in the existing Integrated Municipal Solid Waste Management Facility of Municipal Corporation Gurugram. Baseline data was collected for various environmental attributes so as to compute the impacts that are likely to arise due to the proposed project which include emissions arising out of the present IMSWM project activities.

The potential impacts on the environment from the proposed project are identified based on the nature of various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site. Mitigation measures are proposed to minimize the adverse impacts if any due to the project in the form of Environment Management Plan.

DRAFT EIA-EMP REPORT

CHAPTER-I

INTRODUCTION

1.1 PURPOSE OF THE REPORT

As per the Environmental Impact Assessment (EIA) Notification dated 14th September 2006, as amended from time to time; it is mandatory to have the prior Environmental Clearance for any new industry or expansion of the industry from Ministry of Environment, Forests and Climate Change (MoEF&CC), Government of India, New Delhi for which EIA is required. We conducted as per the guidelines of MoEF&CC, New Delhi to assess the current and existing environmental scenario of the area.

The purpose of this EIA/EMP report is to provide a coherent statement of the potential impacts of proposed expansion project and the measures that should be taken to reduce the impacts and suggest mitigation measures. It contains essential information for:

- The proponent to implement the proposal in an environmentally and socially responsible manner;
- The responsible authority to make an informed decision on the proposal, including the terms and conditions that must be attached to an approval or authorization;
- The public to understand the proposal and its likely impacts on people and the environment.

1.2 INTRODUCTION OF PROJECT

Management of municipal solid wastes is of growing concern to the general public at large, local authorities and business communities in cities and towns across India. The problem is exacerbating in urban areas due to rapid strides in population growth, coupled with an economic boom that encourages the consumption of goods and, hence, wastes generation. The Government of India has taken several initiatives to improve the existing Solid Waste Management practices with technologies in the Country.

Ministry of Environment, Forest & Climate Change (MoEF&CC), Government of India has made Solid Wastes Management Rules, 2016 (SWM rules, 2016) for its sustainable and scientific management, which includes the segregation of waste at the source for 'cleaner

composting' and 'recycling, reuses and reduce' with end disposal of inerts in SLF. This SWM rule, 2016 makes it obligatory for the municipalities, urban local bodies (in particular, municipal authorities) to restrict land filling to non-biodegradable inert waste, and other wastes that are not suitable either for recycling or for biological processing. With this in mind, the guidelines also prohibit to dump the biodegradable component of the waste into the landfills.

The proposed project is for expansion of waste to Energy (WTE) plant from 15 MW to 25 MW at integrated municipal solid waste management facility at Bandwari village, Gurugram. The main objective of the proposed expansion is to collect and process 100% of MSW generated in the area limits and produce valuable compost & RDF for generating electricity using RDF based WTE and to dispose of the inert' s through scientific process of Sanitary Landfilling (SLF). In short, the objective of the project is to introduce appropriate technologies for management of MSW so as to prevent the waste from causing pollution and health hazards. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized.

The proposed expansion project of 25 MW WTE plant in IMSWM facility at Bandhwari is categorized under Item "1(d) Thermal Power Plants- Waste to Energy (WTE)" in the EIA Notification, dated September 14, 2006 and its subsequent amendments.

As per EIA Notification, 2006 & its amendments, all electricity generating units of capacity > 20 MW (using municipal solid non-hazardous waste as fuel) will be treated as category-A project will require Environmental Clearance from MoEF&CC. The expanded capacity of proposed project is 25 MW and also interstate boundary Haryana and Delhi which is distance about 0.98 km from project site, hence a draft Environment Impact Assessment & Environmental Management Plan Report has been considered mandatory for the Public Hearing to Haryana State pollution Control Board (HSPCB) as well as Delhi Pollution Control Committee (DPCC). The EIA report would facilitate in obtaining Environmental Clearance (EC) from the MoEF&CC Government of India, New Delhi for the project.

The proposed project of Integrated Municipal Solid Waste Processing Facility (IMSWM) with Waste to Energy plant of 25 MW capacity is interlinked to sector - 7(i) Common Municipal Solid Waste Management Facility (CMSWMF) and sector- 1(d) Thermal Power Plants- Waste to Energy (WTE) as per EIA Notification 2006 & its subsequent amendments.

Earlier, Environmental Clearance (EC) was granted Vide letter no. F. No. 10-74/2016-IA.Ill for "Integrated Municipal Solid Waste Processing Facility (IMSWM) with Waste to Energy plant of 15 MW capacity" to MCG on 01st November 2019 under sector - 7(i) Common Municipal Solid Waste Management Facility (CMSWMF) as per EIA notification 2006 and its subsequent amendments. EC letter for "Integrated Municipal Solid Waste Processing Facility (IMSWM) with Waste to Energy plant of 15 MW capacity" by MCG is attached as Annexure –I.

Now, MCG and awarded Concessionaire (M/s. Ecogreen Energy Gurgaon Faridabad Pvt Ltd.) has proposed for expansion of WTE plant from 15 MW to 25 MW in the same IMSWM facility at Bandwari and subsequently ToR application was applied and proposal was recommended by EAC (Thermal Power Projects) in its meeting on dt: 28.07.2020 for ToR. As per the recommendation of EAC (Thermal Power Plant) ToR was granded vide F.no. J-13012/08/2020 –IA.I (T) on dt: 16.09.2020 for further conducting EIA/EMP study for the proposed expansion project. Official ToR letter for proposed expansion of WTE plant from 15 MW to 25 MW in IMSWM Facility at Bhandwari village, Gurugram is attached as Annexure –II.

Also, EC compliance reports for "Integrated Municipal Solid Waste Processing Facility (IMSWM) with Waste to Energy plant of 15 MW capacity" where duly certified from MoEF&CC, North Regional Office at Chandigarh vide letter no. 6-18/2019 (ENV)/622-624 dt: 24.09.2020 (Annexure–III) as per the granted EC and Ministry's Circular no. J-11011/S18/2010-IA-1I (I) dt: 30th May 2012 and granted ToR for proposed expansion.

1.2 IDENTIFICATION OF PROJECT & ITS PROPONENT

Gurugram is one of the fastest growing cities in India. Rapid development and habitation in the city is generating all kinds of waste, which is becoming a serious health and sanitation hazard for its residents. Also, in Faridabad due to rapid urbanization huge amount of waste is generated every year. So, management of waste is of utmost importance. The project seeks to improve and develop a socially and environmentally sustainable system of solid waste management which will reduce the associated environmental and public health risks. The project has been designed based on population projections. Present waste quantity, based on average per capita waste generation, in the proposed service area (Gurugram-Faridabad Cluster) is estimated to be about 1165 for year 2015 TPD. Considering the population projection and the waste generation forecast, the total waste quantity in the year 2035 is estimated to be about 2100 TPD.

Identification of project proponent

Applicant	Authorize signatory
Joint Commissioner - SBM Municipal Corporation Gurugram sbm@mcg.gov.in	Dheeraj Kumar

1.3 BRIEF DESCRIPTION OF NATURE, SIZE, LOCATION OF THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY, REGION.

Sr.No.	Particulars	Details
A.	**Nature of the Project**	Integrated Municipal Solid Waste Processing Facility (IMSWM) with proposed expansion of Waste to Energy (WTE) Plant from 15 MW to 25 MW capacity.
B.	**Size of the Project**	
	Existing & Proposed Capacity	Waste quantity: 1165 TPD in 2015, 1565 TPD in 2025 & estimated waste quantity in 2035 will be 2100 TPD (as per 2011 census) Existing Project Area - 30.5 Acres

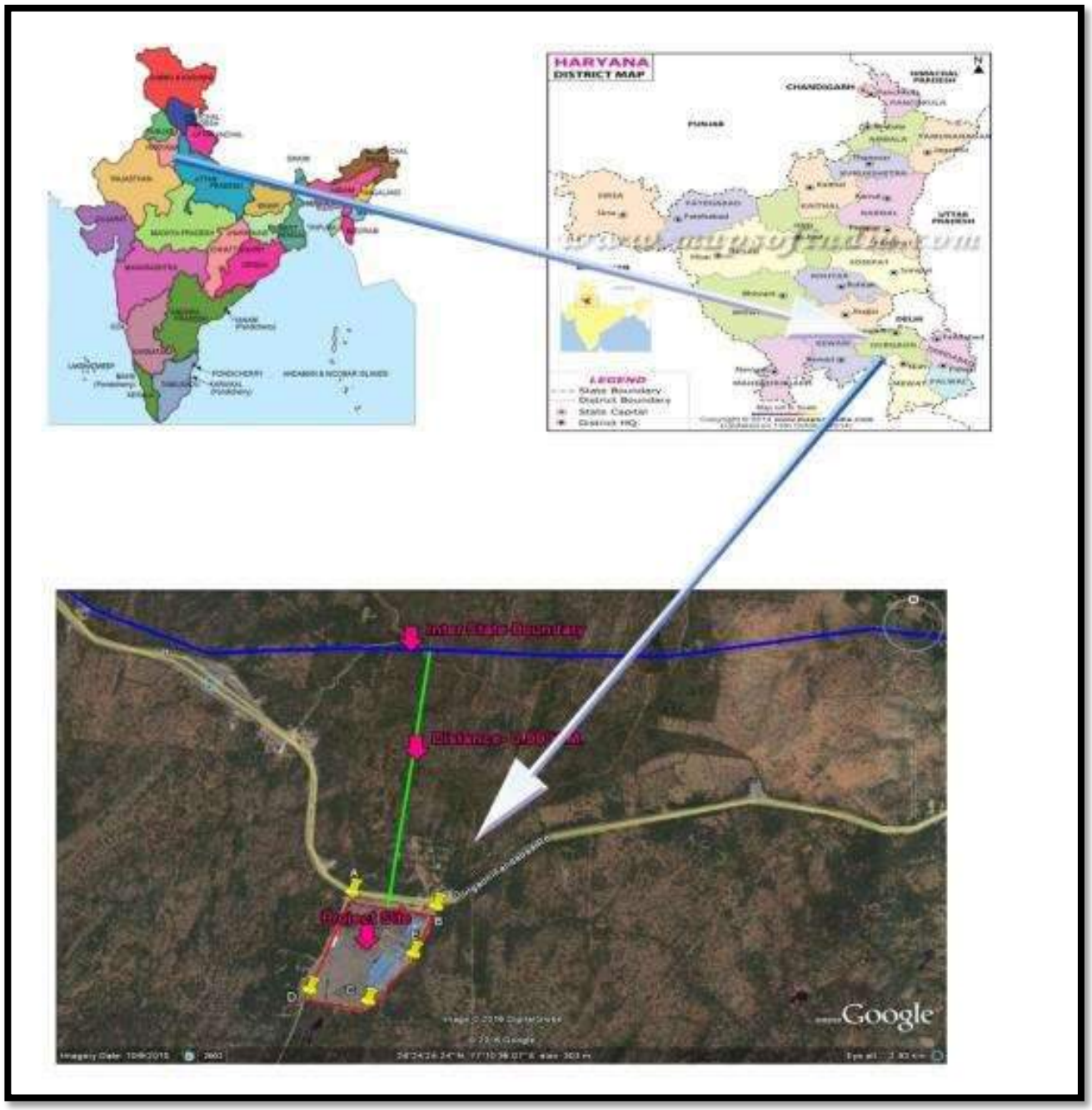
Project Activity/ Components	As per EC awarded	Proposed expansion

Sr.No.	Particulars	Details
		<table><tr><td>Total capacity of facility</td><td>2100 TPD</td><td>NIL</td></tr><tr><td>RDF plant</td><td>1500 TPD</td><td>NIL</td></tr><tr><td>Composting</td><td>147 TPD</td><td>210 TPD</td></tr><tr><td>Area for SLF</td><td colspan="2">24680 Sqm</td></tr><tr><td>Waste to Energy (RDF based)</td><td>15 MW</td><td>25 MW</td></tr></table> Therefore, the following are proposed for expansion in WTE plant: • Proposed expansion to 25 MW • Mechanical Grate type Boilers: 2 No. (750 TPD/each) • Steam Turbine Generator: 1 no. 25 MW • Bag Filters System
2.	Composting	210 TPD
3.	RDF Plant	1500 TPD
4.	Sanitary Landfill	Area: 24680 Sqm,
5.	Waste to Energy (WTE) Plant	25 MW
6	Fuel Supply & Availability for Proposed WTE of 25 MW	Municipal Solid Waste (MSW) shall be processed to make RDF/combustible material further to use as fuel for Power generation.
C	**Location Details**	
1.	Plot no./Kasra no.	46//5/26,15,16,17/1,24/1,24/2,25, 47//8,9,10,11,12,13,18,19,20,21,22,23, 48//1,2,9,10,11,49//3/3,4,5,7,8/1,13/2,14,15
2.	Latitude & Longitude of Project site	E. 28°24'14.89"N 77°10'16.86"E F. 28°24'13.13"N 77°10'27.39"E G. 28°24'01.35"N 77°10'18.83"E H. 28°24'02.72"N 77°10'11.54"E
3.	Topo sheet No.	53H/3, 53H/7
4.	Village	Bandhwari
5.	Tehsil	Gurugram
6.	District	Gurugram
7.	State	Haryana
D	**Environmental Settings of the Area**	
1.	Ecological Sensitive Areas	Asola Wildlife Sanctuary boundary exists at 300 m in NE direction from the project site and is beyond Eco

Sr.No.	Particulars	Details
		Sensitive Zone (ESZ) of Asola WLS which is 150 m at ID P-9 & P-10 points (nearest points to site) as per MoEF&CC notification no. 5.0.1911 (E) dated 31st May 2019 in reference of Asola Bhatti Wildlife Sanctuary. NOC & Clarification letter regarding the same has been obtained.
2.	River / water body	**River/ water body** / **Distance** / **Direction** Jauhar Nala / 1.14 km / SE Lake Shail / 2.25 / SE Water body near village Gothda Mohbtabad / 3.73 / SSE Li Nala / 3.72 km / NW Sharpur Nala / 5.92 km / NNE Paliwala Nala / 6.22 km / E Harcliandpur Distributary / 6.72 km / SE Lake Niharika / 7.81 / E Nekpur Miner / 8.41 km / ESE Bhiruya Nala / 9.35 km / ENE Fatehpur Miner / 9.86 km / SSE Barkhal Lack / 9.70 km / E
3.	Nearest Town / City	Gurugram- 6.44 Km; Faridabad – 9.67 Km
4.	Nearest Railway Station	Faridabad Railway Station at 13.7 km in East Direction
5.	Nearest Airport	Indira Gandhi International Airport at 18.10 km in NNW Direction. NOC from Airports Authority of India has been obtained through vide letter no. AAI/RHR/NR/ATM/NOC/2018/288/1517-1520 dated: 04.09.2018.
6.	State Boundary	Interstate Boundary of Haryana and Delhi lies at 0.98 km from the site
7.	Seismic Zone	Zone – IV [as per IS 1893 (Part-I): 2002]
E	**Cost Details**	
1.	Total Project Cost	61700.92 Lakhs
F	**Requirements of the Project**	
1.	Water Requirement	Construction Phase: 8 -10 KLD

Sr.No.	Particulars	Details
		Source: Municipal Corporation of Gurgaon Operation Phase: 792 KLD (for MSW Processing & WTE plant) + 12 KLD (for Domestic) Source: Nearby STP approved by GMDA and drinking water, separately through MCG approved water tankers. Approval from GMDA to receive 4 MLD reclaimed water from STP for the project operation was obtained Memo no. GMDA/S&S/2018/579 on 24.05.2018.
2.	Power Requirement	Construction Phase: 675 KW (backed up through 630 KVA DG set.) Operation Phase: auxiliary supply from proposed waste to energy plant (backup through 1500 KVA DG set)
3.	Manpower requirement	Construction Phase: Around 600 workers Operation Phase: 2100 (Including manpower required for Waste collection & Transportation)

FIGURE 1.1: LOCATION MAP



Importance to country and region:-

At present Municipal Solid Waste is being collected in segregated manner i.e wet waste, dry waste and domestic hazardous waste. The waste collected from waste generators is

transported in the segregation manner and also collection of recyclables is being practiced at intermediate points of transportation. The transported waste to processing facility is processed through bioremediation and biomining. However, the waste collectors again separate valuables from the waste during the collection of waste. Moreover, rag-pickers unofficially do the segregation & pick recyclables like polythene; plastics etc. at the secondary collection points and existing dumping site and sell to scrap dealers.

As of now, bioremediation, biomining & land reclamation activities are continuously performed at site to process and reduce the quantity of legacy waste and to reclaim land for IMSWM –WtE plant including engineered sanitary landfill and to avoid contamination to ground water and soil pollution, vector nuisance, odor problem, besides becoming breeding grounds for mosquitoes, flies, etc. The leachate generated may cause unsanitary condition in the surroundings. To avoid all above, this project has the prime requirement in the area.

The importance of effective Integrated Municipal Solid Waste Management (IMSWM) with WTE services is to protect public health, the environment and natural resources (Water, Land, and Air). To promote the ecological management of solid waste in compliance with the principle of the 4 R: Reduce, Reuse, Recycle, Recover and safe disposal. An effective MSWM service can be achieved only by improving the efficiency of MSWM activities, thereby leading to the reduction of waste generation, separation of MSW and recycling and recovery of materials, and generation of compost and energy.

- Reduction, reuse and recycle of the waste.
- Source Segregation & collection of waste (Systematic Door to Door collection has been proposed in the project).
- Transportation of waste in covered /closed vehicles to the site.
- Phasing out of conventional open dhalaos at secondary waste collection point and introduction of closed mobile compactors instead in order to prevent waste scattering & maintain good aesthetics of secondary points.
- Processing of waste through composting, RDF and electricity generation.
- Conversion of waste into a useful and marketable product (Manure) as recirculation of soil nutrients.

- Good market for compost sale.
- Only inert/processing rejects to be land filled which is about 20% of total waste quantity shall be disposed of into the landfill. This would save upon the future requirements of area for land filling.
- Reduction of greenhouse gases (carbon foot prints) because of renewable power generation & waste processing.
- Public and private participatory mechanism to ensure a long-term sustainability of the project.
- Commercially viable project and long term sustainability.
- Systematic approach for integrated solid waste management.
- Clean, hygienic and better infrastructure of the city.
- Improved and mechanized services for the community.
- Increase in employment opportunities in collection and transportation, door to door collection and in processing and disposal facility.
- Organized and a scientific sanitary landfill site in order to prevent water & soil contamination.
- Regulatory compliant system.
- Reduce financial burden and operational hassles on the municipal corporation.

1.4 OBJECTIVE OF EIA STUDY

The specific objective of the EIA study is to:

The Municipal Corporation Gurugram is divided into 4 zones, 35 wards. The objective of the project study is to design an integrated solid waste management system in Bandhwari Village while redesigning & improving the existing solid waste management system in an environmentally and economically sustainable manner. The scope of work consists of:-

- Door to Door collection of waste and segregation at source
- Implementation of bins system for secondary storage facility (waste storage depots).
- Improvement of existing transportation system
- Semi mechanized segregation system for separation of recyclable materials.

- Compost production capacity210 TPD of waste.
- Construction of sanitary landfill facility.
- Review of applicable national and international legal environmental requirements.
- Discuss justification for development of the project;
- Establish environmental baseline condition within a study area of 10km radius of the project site.
- Develop Environmental Management Plan (EMP) and Environmental Monitoring Plan;
- Undertake hazard identification and develop Disaster Management Plan; and identify project benefit.
- Predict and evaluate of potential environmental and socio-economic impacts and identify.

1.5 SCOPE OF EIA STUDY

The scope of the Environmental Impact Assessment (EIA) study is in line with standard & Additional Terms of Reference (TOR) issued by the MoEF&CC, New Delhi.

Secondary Data Collection:

Collection of secondary data comprising of information on project conception, planning and development, land details, physical, biological, geological and land use information of the project area, socioeconomic data.

Investigations and surveys:

Environmental investigations and laboratory testing for samples (air, water, and noise and soil quality) and analysis of meteorological Ecological, traffic and social surveys were also conducted in the immediate surrounding area.

Legal framework, statutory requirements and international guidelines:

A desktop review of all the applicable legal framework and statutory requirements (national and state) has been carried out and included in the report. The guidelines pertaining to EHS aspects of solid waste management facilities including waste to energy plant were referred to and included in the report. Under the Environment Impact Assessment Notification, 2006, the project will obtain environment clearance.

As per EIA Notification S.O. No 1533 dated 14th Sep, 2006 and its subsequent amendments the proposed project is interlinked to sector - 7(i) Common Municipal Solid Waste Management Facility (CMSWMF) and sector- 1(d) Thermal Power Plants- Waste to Energy (WTE) under category 'A' as its electricity generation capacity is > 20 MW (using municipal solid non-hazardous waste as fuel) and also due to applicability of general condition of interstate boundary of Haryana & Delhi state which is at a distance about 0.98 km from project site. Hence being appraised by the Expert Appraisal Committee (EAC) – Thermal Power Projects, New Delhi.

The project shall abide by all applicable provisions of the Environment Protection Act, 1986 and rules formed there under. As per the Air (Prevention & Control of Pollution) Act 1981, Water (Prevention & Control of Pollution) Act 1974, Solid Waste Management Rules, 2016, Forest Act 980,Environment Protection Act 1986 and Environment Protection Rule 1989, Wildlife Protection Act 1972,Public Liability Insurance Act,1991 and Hazardous and Other Wastes (Management and Trans boundary Movement) Rules, 2016.

Public consultations and disclosure:

A public consultation was done, as per the procedure prescribed in EIA Notification 2006.

Impact Assessment:

Assessment of the potential impacts with respect to environmental and social aspects has been carried out and their significance determined.

Environmental Management Plan (EMP) along with Monitoring Plan:

Appropriate mitigation and monitoring measures are suggested to minimize any potential damaging effects or any lasting negative consequence.

Scope of the study (compliance of terms of reference)

Point wise compliance of standard & additional ToR points issued by MoEF&CC, Delhi with vide F.no. J-13012/08/2020 –IA.I (T) on dt: 16.09.2020 for the proposed expansion of WTE plant from 15 MW to 25 MW of "Integrated Solid Waste Processing Facility at Bandhwari

Village, Gurugram District, Haryana" by Gurugram Municipal Corporation and also compliances of points mention in the EC compliance certificate via letter no. 6-18/2019 (ENV) /622-624 dt: 24.09.2020 issued by Northern Regional Office, MoEF&CC, Chandigarh.

TABLE NO-1.1 COMPLIANCES TO STANDARD & ADDITIONAL TERMS OF REFERENCE (ToR) AND CONDITIONS IN EC COMPLINCE CERTIFICATE

STANDARD TERMS OF REFERENCE (ToR)		
S.	**Terms of Reference**	**Compliance to Terms of Reference**
1	The proposed project shall be given a unique name in consonance with the name submitted to other Government Departments etc. for its better identification and reference.	The project has been named as "Integrated Municipal Solid Waste Management (IMSWM) Facility with waste to energy plant at Bandhwari Village, Gurgram District, Haryana" Proposed project is an expansion of Waste To Energy (WtE) Plant from 15 MW To 25 MW.
2	Vision document specifying prospective long term plan of the project shall be formulated and Submitted.	The proposed expansion project is designed and formulated for the long term vision by MCG and concessionaire. Refer Chapter 5, Analysis of Alternatives
3	Latest compliance report duly certified by the Regional Office of MoEF&CC for the conditions stipulated in the environmental and CRZ clearances of the previous phase(s) for the expansion projects shall be submitted.	Latest compliance report of June 2020, duly certified by the Northern Regional Office of MoEF&CC, Chandigarh via letter no. 6-18/2019 (ENV) /622-624 dt: 24.09.2020 is enclosed as Annexure - III Also compliances to the observation points are furnished in below table no 1.1.

4	The project proponent needs to identify minimum three potential sites based on environmental, ecological and economic considerations, and choose one appropriate site having minimum impacts on ecology and environment. A detailed comparison of the sites in this regard shall be submitted.	Not applicable as it's a capacity expansion project within same IMSWM-WTE plant to reduce the waste and spread of health hazards. Earlier, Alternate sites have been examined and the existing MSW dump site at Bandhwari was found most appropriate for the project and for proposed expansion of WTE plant from 15 MW to 25 MW as all existing and upcoming waste could be managed as RDF and used as fuel for WTE to reduce the MSW load & increase the life of SLF & decrease pollution. Also reduce transportation & cost of project. Details including siting criteria, alternate technologies, etc. are well furnished in chapter 5
5	Executive summary of the project indicating relevant details along with recent photographs of the proposed site (s) shall be provided. Response to the issues raised during Public Hearing and the written representations (if any), along with a time bound Action Plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.	Executive Summary of the proposed project is included in the EIA/EMP report including all relevant details. Public Hearing is yet to be conducted by HSPCB as per EIA notification 2006 and its subsequent amendments

6	Harnessing solar power within the premises of the plant particularly at available roof tops and other available areas shall be formulated and for expansion projects, status of implementation shall also be submitted.	Adequate Energy efficiency measures will be provided. Solar powered street lamps may be provided at the plant premises.
7	The geographical coordinates (WGS 84) of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) and IRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/nallah/River and high tide level from the sea shall be specified, if the site is located in proximity to them.	The geographical coordinates of the proposed project site (plant Boundaries) are: A. 28°24'14.89"N 77°10'16.86"E B. 28°24'13.13"N 77°10'27.39"E C. 28°24'01.35"N 77°10'18.83"E D. 28°24'02.72"N 77°10'11.54"E The proposed project site falls in Toposheet no. 53H/3 shown in Figure no. 2.2 of chapter no 2 and IRS satellite map of the study area is shown in figure no.3.6 of chapter no. 3 No water body/nallah is passing through the site. The Project location does not lies in HFL/HTL.
8	Layout plan indicating break-up of plant area, ash pond, green belt, infrastructure, roads etc. shall be provided.	Layout plan of proposed project including break up area of IMSWM facility, WTE plant of 25 MW, SLF, and Greenbelt etc. is shown in Figure no. 2.4 and details are tabulated in table no. 2.4 of chapter 2.

9	Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement shall be provided.	The Land requirement has been optimized and the proposed WTE plant of 25 MW is proposed in the IMSWM area i. e 30.5 acres only which is already reserved plot for IMSWM facility.
10	Present land use (including land class/kism) as per the revenue records and State Govt. records of the proposed site shall be furnished. Information on land to be acquired including coal transportation system, laying of pipeline, ROW, transmission lines etc. shall be specifically submitted. Status of land acquisition and litigation, if any, should be provided.	Land allotted for the project belongs to Municipal Corporation of Gurgaon (MCG) and accordingly Land Lease Agreement (LLA) was signed with the concessionaire selected for the project. • Total IMSWM area: 30.5 acres • Proposed expansion of WTE (25 MW) is within the IMSWM plant premises. Details of land including kasra no. are furnished in section no. 2.3 and 2.7.1 of chapter 2. Land Documents are enclosed as Annexure - IV No litigation is pending against the Project. Except one PIL was filed before Hon'ble National Green Tribunal vides M.A. NO: 1310 OF 2017 IN Original Application no. 514/2018 and Earlier O.A No. 415 OF 2015 and a revised action plan report for the same has been submitted to Hon'ble NGT on 26th February 2020. A copy of Hon'ble NGT order & revised action plan by Municipal Corporation of Gurugram is attached as **Annexure- V**

11	If the project involves forest land, details of application, including date of application, area applied for, and application registration number, for diversion under FCA and its status should be provided along with copies of relevant documents.	Land allotted for the project belongs to Municipal Corporation of Gurgaon (MCG). It has no forest land. and accordingly Land Lease Agreement (LLA) was signed with the concessionaire selected for the project. And the proposed WTE plant of 25 MW is proposed in the IMSWM area i. e 30.5 acres only which is already reserved plot for IMSWM facility.
12	The land acquisition and R&R scheme with a time bound Action Plan should be formulated and addressed in the EIA report	Not Applicable
13	Satellite imagery and authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallahs, ponds etc.), location of nearest habitations (villages), creeks, mangroves, rivers, reservoirs etc. in the study area shall be provided.	IRS satellite map of the study area is shown in figure no.3.6 of chapter no. 3

14	Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the State or an officer authorized by him.	There are no National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes located in the study area except Asola Wildlife Sanctuary boundary which exists at 300 m in NE direction from the project site and is beyond Eco Sensitive Zone (ESZ) of Asola WLS which is 150 m at ID P-9 & P-10 points (nearest points to site) as per MoEFCC notification no. 5.0.1911 (E) dated 31st May 2019 in reference of Asola Bhatti Wildlife Sanctuary. NOC & Clarification letter regarding the same has been enclosed as Annexure -VI
15	Topography of the study area supported by Toposheet on 1:50,000 scale of Survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of required fill material; its source, transportation etc. shall be submitted.	The proposed project site falls in Toposheet no. 53H/3 shown in Figure no. 2.2 of chapter no 2. No filling of site is required as the proposed site is designated for IMSWM with WTE plant only.

16	A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land be acquired and developed and detailed plan submitted.	Detailed study of Land Use pattern & Land cover was presented in section no. 3.4.7 of chapter 3. No Land acquisition is involved. The land is already in possession of Municipal Corporation Gurugram and is meant for intended purpose only.
17	A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on potentially mineable mineral deposit shall be submitted.	The project study area doesn't involve any mineral deposit area.
18	Details of fly ash utilization plan as per the latest fly ash Utilization Notification of GOI along with firm agreements / MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.	Ash generated in the WTE plant shall be stabilised and transported to landfill. Also it will be utilising for road bed construction, deep pit filling, brick making etc. according to Fly ash notification 1999 and its subsequent amendments. Details for Fly ash & bottom ash utilization and disposal are well furnished in chapter 4, section 4.8.

19	The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by CEA from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance calculated shall take into account reuse and recirculation of effluents.	The water requirement for the plant is optimised using recirculation and reuse of treated water in the plant premises itself. Total water requirement in the project during operation phase the total supply water for process and power production in the whole plant is 33 m3/h (792 KLD) which will be sourced from nearby STP approved by GMDA (Memo no. GMDA/S&S/2018/579 on 24.05.2018) and required domestic water of 0.5 m3/h i.e 12 KLD will be sourced separately through MCG approved water tankers. Water Balance diagram is shown in figure no.2.15 of Chapter 2.
20	Water body/Nallah (if any) passing across the site should not be disturbed as far as possible. In case any Nallah / drain is proposed to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of proposed diversion shall be furnished duly approved by the concerned Department of the State.	No water body/nallah is passing through the site and diversion of natural water body is not involved. Natural drainage pattern of the study area is shown in figure no. 3.8 of chapter 3.

21	It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system / streams etc. and the boundary of site should also be located 500 m away from railway track and National Highways.	There is no HFL/HTL, river system/streams. Highways etc. within 1 km distant from the project boundary. Details of surface water bodies exist within study area are given in section 2.5 of chapter 2 and figure no. 3.8 of chapter 3. The nearest National Highway – 236 is located at a distance of 13.39 km north west direction.
22	Hydro-geological study of the area shall be carried out through an institute/ organization of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bound Action Plan for its implementation shall be submitted	Hydrogeological study of study area was carried out and well spelled in section 7.2 of chapter 7. Also Hydrogeological study was carried out for the IMSWM project site.
23	Detailed Studies on the impacts of the ecology including fisheries of the River/Estuary/Sea due to the proposed withdrawal of water / discharge of treated wastewater into the River/Sea etc shall be Carried out and submitted along with the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea.	Detailed Study on impact of ecology and biodiversity was carried out for the IMSWM project site. The water requirement for the project will be meet through nearby STP approved by GMDA and treated water will be reused in the plant for vehicle washing, greenbelt development and floor washing etc.

24	Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project and commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water.	Total water requirement in the project during operation phase the total supply water for process and power production in the whole plant is 33 m3/h (792 KLD) which will be sourced from nearby STP approved by GMDA (Memo no. GMDA/S&S/2018/579 on 24.05.2018) and required drinking water of 0.5 m^3/h i.e 12 KLD will be sourced separately through MCG approved water tankers. Thus, there will be no significant impact on ecology due to above even in lean season. Approval Letter from GMDA is enclosed as Annexure - VII
25	Detailed plan for rainwater harvesting and its proposed utilization in the plant shall be furnished.	Detailed plan of Rain water Harvesting is proposed in section 7.3 of chapter 7.
26	Feasibility of near zero discharge concept shall be critically examined and its details submitted.	The water requirement for the plant is optimised using recirculation and reuse of treated water in the plant premises itself for vehicle washing, greenbelt development and floor washing etc. Water Balance diagram is shown in figure no.2.15 of Chapter 2.

27	Optimization of Cycles of Concentration (COC) along with other water conservation measures in the project shall be specified.	As per the water balance diagram, the ultrafiltration backwash drainage, boiler blowdown cooling pool drainage, cooling tower blowdown and part of treated water from LTP will be sent to the reuse pool for reuse in reaction tower flue gas water, roads washing and greening water, slurry preparation and cooling water, and flushing water between discharge rooms.
28	Plan for recirculation of ash pond water and its implementation shall be submitted.	The ash pond water will be collected in a pool and then reused as the spray water for dry ash in the ash pond, and will not discharged.
29	Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals. A provision for long-term monitoring of ground water table using Piezometer shall be incorporated in EIA, particularly from the study area.	Detailed Environmental monitoring plan is been provided for the proposed project for regular monitoring of water quality in and around the project site in as per SWM rules 2016 and CPCB guidelines. Table 6.2 of chapter 6.

30	Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out through a reputed institute / agency which shall consist of detail assessment of the impact on livelihood of the local communities.	Socio-economic study of the study area comprising of 10 km from the plant site was carried out and furnished in chapter 3 in section 3.4.8.
31	Action Plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during construction & operation phases of the Project.	Majority of workers will be hired locally. During construction phase around 600 workers will be required including contractual & non contractual manpower (i.e. Officers, skilled workers & semi-skilled workers). During operation phase 2100 workers (including manpower required for waste collection & transportation) will be required.
32	If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land.	Not Applicable. The project area does not fall in Tribal area.

33	A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study and Public Hearing issues. Sustainable income generating measures which can help in Upliftment of affected section of society, which is consistent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified.	Municipal Corporation Gurugram (MCG) implements CSR is various ways to improve the society conditions and its people by promoting local employment, greenery development and water facilities etc in villages adjacent to project site and also in Gurugram District. Details of CSR activities & plan are mention in section 9.6, and figure no. 9.2 of chapter 9.
34	While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide Action Plan for the status of implementation of the scheme from time to time and dovetail the same with any Govt. scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.	Municipal Corporation Gurugram (MCG) implements CSR is various ways by promoting local employment, greenery development and water facilities etc in villages adjacent to project site and also in Gurugram District. Details of few CSR activities conducted by MCG, Haryana are mention in section 9.6, and figure no. 9.2 of chapter 9.

35	R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census of population based on socio economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.	Not Applicable, as its expansion project on existing land.
36	Assessment of occupational health and endemic diseases of environmental origin in the study area shall be carried out and Action Plan to mitigate the same shall be prepared.	Assessment of occupational health and endemic diseases of environmental origin in the study area were carried out in section 3.4.8, g. of chapter 3 and mitigation plan is suggested in section 4.10 of chapter 4 Odour nuisance control & vector control at plant will be done through inbuilt systems like herbal sanitizer, greenbelt, aroma tree plantation etc.
37	Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme	The employees/ labours will provided with PPE and medical check-ups/vaccinations at regular intervals. Facilities like medical check-ups, awareness etc will be provided.

38	One complete season site specific meteorological and AAQ data (except monsoon season) as per latest MoEF&CC Notification shall be collected and the dates of monitoring shall be recorded. The Parameters to be covered for AAQ shall include PM10, PM2.5, SO2, NOx, CO and Hg. The location of the monitoring stations should be so decided so as to take into consideration the upwind direction, Pre-dominant downwind direction, other dominant directions, habitation and sensitive receptors. There should be at least one monitoring station each in the upwind and in the pre – dominant Downwind direction at a location where maximum ground level concentration is likely to occur.	The details of monitoring locations, meteorological and AAQ data are described in Chapter-3 of EIA/EMP report. Analysis Results are tabulated in Table 3.5 to 3.9 of chapter 3 and Annexure-VIII

39	In case of expansion project, air quality monitoring data of 104 observations a year for relevant parameters at air quality monitoring stations as identified/stipulated shall be submitted to assess for compliance of AAQ Standards (annual average as well as 24 hrs).	The proposed project is for expansion of waste to Energy (WTE) plant from 15 MW to 25 MW at integrated municipal solid waste management facility at Bandwari village, Gurugram. Earlier, IMSWM project with WTE of 15 MW capacity was proposed and EC was obtained on 1st Nov 2019, Vide letter no. F. No. 10-74/2016-IA.III. The progress activities of project were affected due to admit nCOVID – 19 Pandemic situations worldwide. The details of monitoring locations, meteorological and AAQ data are described in Chapter-3 of EIA/EMP report. Analysis Results are tabulated in Table 3.5 to 3.9 of chapter 3 and Annexure - VIII
40	A list of industries existing and proposed in the study area shall be furnished.	List of important and major industries in the study are furnished in chapter 3, Section 3.2 table no. 3.1

41	Cumulative impacts of all sources of emissions including handling and transportation of existing and proposed projects on the environment of the area shall be assessed in detail. Details of the Model used and the input data used for modelling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The wind rose and isopleths should also be shown on the location map. The cumulative study should also include impacts on water, soil and socio-economics	AAQ data are described in Chapter-3 of EIA/EMP report. Analysis Results are tabulated in Table 3.5 to 3.9 of chapter 3 and anticipated impacts & its mitigation measures including isopleths are described in section 4.6.3 of chapter 4.
42	Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.	Not applicable. Proposed WTE plant will not use coal as fuel. It will utilize RDF from municipal waste as fuel.
43	Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quantity, quality, storage etc should also be furnished.	The project proposal is for expansion of waste to energy (RDF based as fuel) plant from 15 MW to 25 MW in IMSWM which includes Mechanical Grate type Boilers: 2 No. (750 TPD/each). Light diesel fuel will be used for ignition burner and auxiliary burner. The quantity RDF will be 1500 TPD which will be totally used for generating 25 MW of power in proposed WTE. RDF quality report is presented as Annexure - IX

44	Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished. The Ministry's Notification dated 02.01.2014 regarding ash content in coal shall be complied. For the expansion projects, the compliance of the existing units to the said Notification shall also be submitted.	Proposed WTE plant will not use coal as fuel. It will utilize RDF from municipal waste as fuel. Hence, the notification regarding ash content in coal is not applicable.
45	Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/conveyor belt.	Proposed WTE plant will utilize RDF as fuel. RDF will be produced from processing of municipal waste in the same IMSWM facility. Hence, no transportation of fuel from source is required for the proposed project.
46	For proposals based on imported coal, inland transportation and port handling and rail movement shall be examined and details furnished. The approval of the Port and Rail Authorities shall be submitted.	Not Applicable. Proposed WTE plant will not use coal as fuel. It will utilize RDF from municipal waste as fuel.
47	Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.	During construction phase, labours including the truck drivers will utilize the existing provided facilities like drinking water, sanitation, restroom etc. on the site and provided by the construction agency.

48	EMP to mitigate the adverse impacts due to the project along with item - wise cost of its implementation in a time bound manner shall be specified.	The detail of the EMP and item wise cost for implementation is given in section 9.5, table no. 9.4, Chapter-9 of EIA report.
49	A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided. Mock drills shall be suitably carried out from time to time to check the efficiency of the plans drawn.	The risk assessment study including Disaster Management Plan and emergency Management plan has been described in Chapter-7 section 7.4.2.
50	The DMP so formulated shall include measures against likely Fires/Tsunami/Cyclones/Storm Surges/ Earthquakes etc., as applicable. It shall be ensured that DMP consists of both On-site and Off-site plans, complete with details of containing likely disaster and shall specifically mention personnel Identified for the task. Smaller version of the plan for different possible disasters shall be prepared Both in English and local languages and circulated widely.	Detailed DMP is formulated including in-site & off-site plans for the project in section 7.4.2 of chapter 7

51	Detailed scheme for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary with tree density of 2000 to 2500 trees per ha with a good survival rate of around 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports in case of expansion projects. A shrub layer beneath tree layer would serve as an effective sieve for dust and sink for CO2 and other gaseous pollutants and hence a stratified green belt should be developed.	Detailed Greenbelt development plan is furnished including the proposed plantation plan of native species at the site as per CPCB guidelines in section 9.4 of chapter 9.
52	Over and above the green belt, as carbon sink, plan for additional plantation shall be drawn by identifying blocks of degraded forests, in close consultation with the District Forests Department. In pursuance to this the project proponent shall formulate time bound Action Plans along with financial allocation and shall submit status of implementation to the Ministry every six months.	Greenbelt has been planned in the periphery of the proposed project site which along with the other planned green areas within the site, will cover about 33 % of the total project area i.e 40666 Sqm. The closed landfill cover will also be provided with green vegetation.
53		
a	Does the company have a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.	Complied. The M/s. Ecogreen Energy Gurgaon- Faridabad Private limited (awarded Concessionaire of MCG for proposed project) has effectively laid down Environment, Health & Safety

b	Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / Conditions? If so, it may be detailed in the EIA.	Policy approved by its board of Directors and consultation with project proponent i.e Municipal Corporation Gurugram (MCG). EHS Policy is attached as Annexures - X
c	What is the hierarchical system or Administrative order of the company to deal with the Environmental issues and for ensuring compliance with the environmental clearance conditions? Details of this system may be given.	
d	Does the company has compliance management system in place wherein compliance status along with compliances / violations of environmental norms are reported to the CMD and the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.	

54	Details of litigation pending or otherwise with respect to project in any Court, Tribunal etc. shall invariably be furnished.	No litigation is pending against the Project. One PIL was filed before Hon'ble National Green Tribunal vides M.A. NO. 1310 OF 2017 IN Original Application no. 514/2018 and Earlier O.A No. 415 OF 2015 and a revised action plan report for the same has been submitted to Hon'ble NGT on 26th February 2020. A copy of Hon'ble NGT order & revised action plan by Municipal Corporation of Gurugram is attached as **Annexure - V**
	GENERAL POINTS	
a	All documents to be properly referenced with index, page number and continuous page numbering.	Agreed & Complied
b	Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated.	Followed and Complied
c	Where the documents provided are in a language other than English, an English translation should be provided.	Agreed
d	The Questionnaire for environmental appraisal of thermal power projects as devised earlier by the ministry shall also be filled and submitted.	Agreed and complied

e	The consultant involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI) / National Accreditation Board of Educations and training (NABET) would need to include a certificate in this regard in the EIA/EMP reports prepared by them and data provided by other organization / Laboratories including	Followed and Complied

ADDITIONAL TERMS OF REFERENCE (TOR)		
S.No.	**ToR Points**	**Compliances**
1.	Proximate and ultimate analysis, Calorific value of municipal waste proposed to be brought from Gurugram and Faridabad shall be carried out for design purpose of boilers.Mass balance of waste in the process shall be submitted.	Proximate and ultimate analysis report of municipal waste and RDF for Gurgaon cluster is detailed in section 2.7.5 of chapter 2 for design purpose of proposed boiler. Mass balance of the waste with process flow diagram is shown in figure no. 2.7 of chapter 2
2.	Air Pollution control measures including NOx control measures, Leachate treatment methods shall be proposed.	Flue Gas Cleaning/Purification System (FGCS) including SNCR for NOx emission control is proposed as air pollution control devise for flue gases from incinerator. Detailed description of proposed FGCS is mention in chapter 2, section 2.7.6. Considering waste processing of 2100 TPD and other waste water from the

		plant, capacity of Leachate Treatment plant (LTP) is 500 KLD as per following estimate. The proposed leachate management comprise of following major procedures: a. Leachate collection & Treatment b. Leachate minimization The treated water from LTP will be reused for in reaction tower flue gas water, roads washing, greening water, and slurry preparation, cooling water, and flushing water between discharge rooms. Detailed description of LTP is well furnished in chapter 2, section 2.7.8.
3.	The air pollution control measures and leachate treatment systems shall conform the emission and waste water standards provided in Solid Waste Management Rules, 2016.	Agreed and shall be complied
4.	Heavy metal content analysis in the fly ash shall be carried out at laboratory scale for similar plant to estimate the hazardous content of the ash generated from the waste to energy plant.	To estimate the hazard content of ash generated from the proposed waste to energy plant, an analysis report of similar plant is attached as Annexure –XI. It was observed that all the parameters analysed were as per standards of CPCB/HSPCB & SWM rules, 2016. And same shall be followed for proposed project.

5.	The bio-diversity study of Asola Bhatti Wildlife sanctuary shall be carried out and likely impacts due to proposed project activities shall be predicted. Suitable mitigation measures along with bio-diversity conservation plan shall be prepared in consultation with Monitoring Committee of ESZ-Asola Bhatti Wildlife Sanctuary. An authenticated map showing Wildlife Sanctuary and its ESZ vis a vis project boundary shall be vetted by Chief Wildlife Warden for both national territory of Delhi and Haryana region.	NOC from the Principal Chief Conservator of Forest and Chief Wildlife Warden, Haryana was obtained vide letter no. 992 on dated: 09/07/19 certifying that the project is outside the defined Eco-sensitive zone of the Asola Bhatti Wildlife Sanctuary as per Notification dated: 31.05.2019. Annexure – VI. A detailed site specific conservation plan & wildlife management plan was prepared and approved by Principal Chief Conservator of Forest & Chief Wildlife Warden, Haryana vide letter no. 992 dated: 09/07/19.
6.	As the interstate boundary of Haryana and Delhi lies at a distance of 0.98km from project site, affected people from Delhi residing within 10km radius of the project shall also be invited to participate in the Public Hearing. Accordingly, the representative of Delhi Pollution Control Committee shall also be invited to the Public Hearing to ensure such participation.	Agreed and shall be followed. Public Hearing for the proposed project shall be conducted in accordance with the EIA notification 2006 & HSPCB and its proceedings will be incorporated in Final EIA/EMP report. Also invitation to the representative of DPCC will be given for participation in Public Hearing.
7.	Proponent should utilise the treated water from leachate treatment system instead discharging into the public sewerage and	The water requirement of the proposed plant is optimized and reduced to 33 m3/h (792 KLD) which

	the balance water may be sourced from MCG which will reduce fresh water consumption.	will be sourced from nearby STP approved by GMDA (Memo no. GMDA/S&S/2018/579 on 24.05.2018) and required drinking water of 0.5 m3/h i.e 12 KLD will be sourced separately through MCG approved water tankers. And the treated water from LTP will be utilized for reaction tower flue gas treatment, roads washing, greening water, and slurry preparation, cooling water, and flushing water between discharge rooms. Water Balance diagram is shown in figure no.2.15 of Chapter 2.
8.	In addition to the above, information on the following may also be incorporated in the EIA report.	
	Is the project intended to have CDM intent	CDM aspects The Estimated annual carbon emission of this proposed project of IMSWM with 25 MW WtE is 285912t/y (annual operating hours are considered as 8000h), which is converted into a power generation of 1.542kg/kwh.
	i. If not then why?	
	ii. If yes then,	
	a. Has PIN (Project Idea Note) {or PCN (Project Concept Note)} submitted to the NCA? (National CDM Authority) in the MOEF?	
	b. If not, then by when is that expected?	
	c. Has PDD, (Project Design Document) been prepared?	
	d. What is the Carbon Intensity? From your electricity generation projected (i.e. CO2 Tons/MWH or Kg/KWH)	
	e. Amount of CO2 in Tons/year expected to be reduced from the baseline data available on the CEA? web-site (www.cea.nic.in)	
	f. Notwithstanding 1(i) above, data on (d) & (e) above shall be worked out and reported	

9	The Environmental clearance shall be applied only after fuel and water linkages are firmed up.	Fuel and water linkages have already been established.
10	After preparing the draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the same shall be submitted to concern SPCB for conducting the public hearing as per procedure of EIA notification 2006. The issues emerged during public hearing shall be further incorporated in the Draft EIA/EMP report. The final EIA/EMP report along with public hearing report and the requisite documents (*including written objections, if any*) shall be submitted to the Ministry for appraisal by the Expert Appraisal committee for consideration of awarding environmental Clearance under the provision of Environmental Impact Assessment notification dated September 14, 2006.	Agreed
11	The ToRs prescribed shall be valid for a period of Four years from the date of issue for submission of final EIA/EMP reports, after public consultation.	Agreed

CONDITION IN EC COMPLIANCE CERTIFICATE		
SN	**Conditions (as per EC compliance Certificate)**	**Compliances**
1.	To the tune of approximately 25 Lakhs MT	Presently, Reclamation of site

	unprocessed/Legacy waste was lying at the proposed site.	activities using Biomining of legacy waste is continuously going on in Bhandwari site to reduce the legacy waste for the proposed IMSWM-WTE project.
2.	PP has channelized the leachate with layers of rubber sheets which is further being collected into ponds within the premises.	Leachate generated from legacy waste is being channelized and collected into ponds within the premises for further treatment and reuse.
3.	RO Systems were also installed to treat the leachate. However, as noticed during the site visit, the amount of leachate was increased manifold with repeated rainfall events in the rainy season. Thus, overflow of the diluted leachate from the site and further contamination of ground water cannot be overruled.	DTRO systems were installed for treatment of generated leachate from legacy waste. A surface water drainage line which collects and removes all surface runoff from the site will be provided to avoid overflow of water and mix with leachate.
4.	PP informed that total nine trommel machines are planned to process legacy mixed waste. However, only three machines (300 TPD/Machine) were operational during the site visit.	At Present, all the 9 No. of trommels (300 TPDcapacity) are under operation for processing and treatment of legacy waste at Bhandwari IMSWM site.
5.	Due to the continuous delivery of unsegregated waste by the local authorities at the site and the insufficient number of trammel machines installed to process the legacy mixed waste, the condition of the plant and the surrounding is subject to further deterioration.	Continuous activities of site reclamation at Bhandwari village from legacy waste is going on Biomining of legacy waste is continuously going on in Bhandwari site for the proposed IMSWM-WTE project.
6.	No litigation is pending against the PP, as	A revised action plan report for the

	submitted. One PIL, however, filed before the Hon'ble NGT vides M.A. No.1310 of 2017 in OA No. 514 of 2015	same has been submitted to Hon'ble NGT on 26th February 2020. A copy of Hon'ble NGT order & revised action plan by Municipal Corporation of Gurugram is attached as **Annexure - V**

CHAPTER - II

PROJECT DESCRIPTION

2.1 TYPE OF PROJECT

Earlier, this project "Integrated municipal solid waste management project consists of processing facility with waste to energy plant of 15 MW capacity" was categorized under 7 (i) – Common Municipal Solid Waste Management Facility (CMSWMF) under Category B" but it was apprised as "A" because applicability of general conditions as Inter State Boundary of Haryana and Delhi lies at a distance of 0.98 km from project site.

Presently, this proposal is for expansion of power generation capacity in the project from 15MW to 25 MW, Therefore, this proposal falls under scheduled 1(d) (Thermal Power Plant), Category "A".

The proposed expansion is planned in accordance to the SWM rules, 2016 and it consists of waste collection system, segregation facility, waste processing unit, a sanitary landfill (SLF) and RDF based WtE of 25 MW power generation capacity.

2.2 NEED FOR THE PROJECT

Solid waste management has been an issue of major concern since the last two decades. Even then, the current waste management systems are collapsing under the pressures mainly caused by unmitigated urban growth. The solutions to the waste management adopted in developed countries have either little or no relevance to local conditions in developing countries particularly in India. With the onset of the population explosion in Haryana, the quantum of MSW generation has also considerably increased. The present scene in waste management, displays an array of problems, including low collection coverage, irregular collection services, open dumping, burning and the handling and control of informal waste picking or scavenging activities. The safe and reliable long-term disposal of solid waste is a vital component of integrated waste management.

In times gone by, landfills have been the most common, environmentally and economically acceptable method of disposal of municipal solid waste. Even with the implementation of recycling and waste-to-energy treatment to reduce it, disposal onto landfills remains a significant component of an integrated waste management strategy. The project seeks to

improve and develop a socially and environmentally sustainable system of solid waste management which will reduce the associated environmental and public health risks in line with SWM rules, 2016 and CPCB/SPCB guidelines.

The project intends to create a socially, economically and environmentally viable solid waste management system to develop an environmentally and aesthetically sound MSW processing site. The major objective is to reduce the solid waste generated in huge quantity and its associated health risks in Gurgaon Faridabad Cluster.

In this regard, the Municipal Corporation of Gurgaon the designated ULB for Gurgaon Faridabad cluster intends to obtain environmental clearance from the Ministry of Environment, Forest & Climate Change for expansion of IMSWM Facility along with waste to energy plant from 15MW to 25 MW for Gurgaon and Faridabad ULB's at Bandhwari village, in Gurgaon district, Haryana.

2.3 LOCATION & TOPOGRAPICAL DETAILS OF THE PROJECT

The IMSWM facility with WtE plant is situated in Village Bandhwari, Tehsil & District: Gurugram in Haryana state of India. The details of project site i.e latitude, longitude, Khasra no. and total project area are given in below table no. 2.1.

TABLE NO-2.1 COORDINATE OF THE PROJECT AREA

Sr. No.	Latitude	Longitude	Khasra No.	Area of Land
1.	28°24'14.89"N	77°10'16.86"E	46//5/2-6-15-16-17/1-24-25, 47//8-9-10-11-12-13-18-19-20-21-22-23, 48//1-2-9-10-11, 49//3/3-4-5-6-7-8/1-13/2-14-15.	30.5 Acres
2.	28°24'13.13"N	77°10'27.39"E		
3.	28°24'01.35"N	77°10'18.83"E		
4.	28°24'02.72"N	77°10'11.54"E		

The current site elevation of this project site is north high, low south, high east and low west. The site height is between 301.126m（WGS--World Geodetic System, the same

below) and 306.451m, and the site height difference is about 5.32m. The topographic map/Key plan of the study area of 10 km radius is given figure 2.2.

2.4 PROJECT SITE CONNECTIVITY

The IMSWM project site at Bandhwari village is very well connected with roads, rail & air. The nearest road which connects to project site is Faridabad- Gurgaon Road (MDR-137) at 300m on North direction and NH-236 at a distance of 1339 km on North West direction.

The nearest railway station is Faridabad located at a distance of 13.7 km in East direction. Indira Gandhi International airport is the nearest airport at an aerial distance of 18.10 km in North West direction. Google map and topographical map showing project site location are given in Figure 2.1 & 2.2.

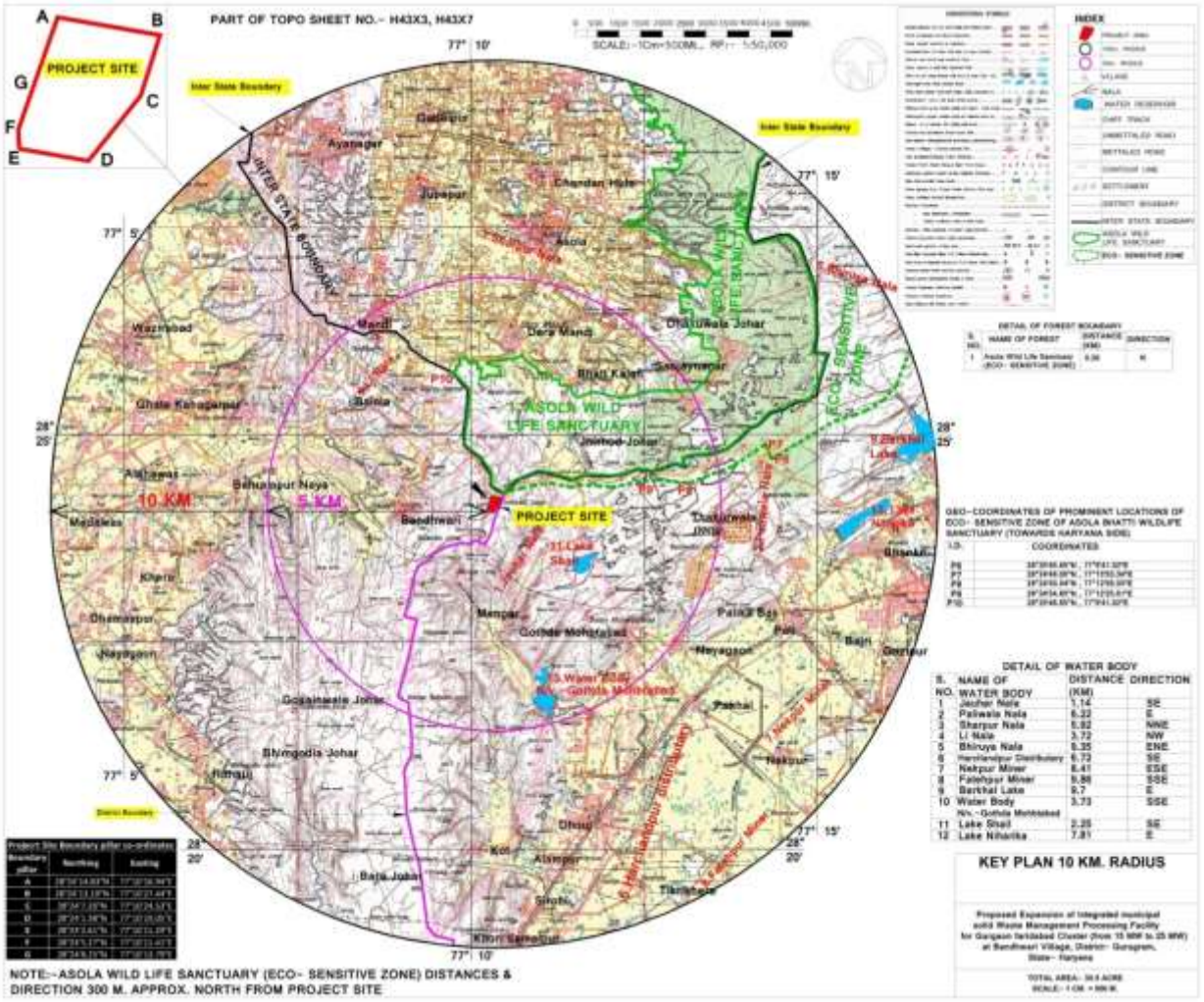
2.5 ENVIRONMENTAL SENSITIVITY OF STUDY AREA

<table>
<tr><th colspan="3">Environmental Settings of the Study Area</th></tr>
<tr><td>1.</td><td>Ecological Sensitive Areas</td><td>Asola Wildlife Sanctuary exists at 300 m approx. in NE direction from the project site. (As per MoEF & CC Notification on 31st May 2019 in reference of Asola Bhatti Wildlife Sanctuary).
NOC & Clarification letter regarding the same has been enclosed as Annexure - VI</td></tr>
<tr><td>2.</td><td>River / water body</td><td>
<table>
<tr><th>River/ Surface water body</th><th>Distance</th><th>Direction</th></tr>
<tr><td>Jauhar Nala</td><td>1.14 km</td><td>NE</td></tr>
<tr><td>Paliwala Nala</td><td>6.22 km</td><td>E</td></tr>
<tr><td>Sharpur Nala</td><td>5.92 km</td><td>NNE</td></tr>
<tr><td>Li Nala</td><td>3.72 km</td><td>NW</td></tr>
<tr><td>Bhiruya Nala</td><td>9.35 km</td><td>ENE</td></tr>
<tr><td>Harcliandpur Distributary</td><td>6.72 km</td><td>SE</td></tr>
<tr><td>Nekpur Miner</td><td>8.41 km</td><td>ESE</td></tr>
<tr><td>Fatehpur Miner</td><td>9.86 km</td><td>SSE</td></tr>
<tr><td>Barkhal Lack</td><td>9.70 km</td><td>E</td></tr>
<tr><td>Water body</td><td>3.73 km</td><td>SSE</td></tr>
<tr><td>Lake</td><td>2.25 km</td><td>SE</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>Nearest Town / City</td><td>Gurgaon- 6.44 Km; Faridabad – 9.67 Km</td></tr>
<tr><td>4.</td><td>Nearest Railway Station</td><td>Faridabad Railway Station at 13.7 km in East Direction</td></tr>
</table>

5.	Nearest Airport	Indira Gandhi International Airport at 18.10 km in NNW Direction. NOC from Airports Authority of India has been obtained through vide letter no. AAI/RHR/NR/ATM/NOC/2018/288/1517-1520 dated: 04.09.2018 Annexure - XII
6.	State Boundary	Interstate Boundary of Haryana and Delhi lies at a distance of 0.98 km from the site.
7.	Seismic Zone	Zone – IV as per the Indian Standard Seismic Zoning Map [IS 1893 (Part-I): 2002]

FIGURE 2.1: GOOGLE IMAGE OF THE AREA

FIGURE 2.2: TOPOLOGICAL/KEY PLAN OF THE AREA



2.6 SIZE OR MAGNITUDE OF OPERATION (Incl. Associated Activities Required by or for the Project)

Size & Magnitude of Proposed Expansion IMSWM Project

The proposed project is designed to process approx. 2100 TPD of Municipal solid waste (MSW) on per day basis. The unit would comprise of the following components for scientifically sound treatment of municipal solid waste.

1. Compost Production capacity – 210 TPD
2. Refused Derived Fuel (RDF): 1500 TPD
3. Sanitary Landfill Area: 24680 Sqm
4. Waste to Energy Plant: 25 MW (RDF based)
    - Mechanical Grate type Boilers: 2 No. (750 TPD/each)
    - Steam Turbine Generator: 1 no. 25 MW
5. Leachate collection & treatment system
6. Flue Gas Cleaning System
    - "SNCR furnace denitration system
    - Semi-dry flue gas deacidification tower
    - Dry powder injection adsorption system
    - Activated carbon injection adsorption system
    - Bag filters

2.6.1 Current Scenario of municipal solid waste management

Gurugram is one of the fastest growing cities in India. Rapid development and habitation in the city is generating all kinds of waste, which is becoming a serious health and sanitation hazard for its residents. Also in Faridabad due to rapid urbanization huge amount of waste is generated every year. So management of waste is of utmost importance.

As the MSW Bandhwari site was an existing dumpsite and approximately 25 lakh ton of legacy waste was present at the site which is at present is treated by Bioremediation and Biomining and land will reclaimed for setting up of proposed IMSWM with WtE for further MSW treatment & disposal.

2.6.1.1 Bioremediation & Biomining of Legacy Waste and Land Reclamation

Treatment of Legacy waste can be carried out by Bioremediation and Biomining. The process of stabilization of waste by exposure of airless heaps to air for removal of entrapped methane and to completely decompose biodegradable material into odourless form without producing any leachate is known as bioremediation. Addition of biocultures during the process of stabilization accelerates the process of decomposition. The steps involved in the process of bioremediation and biomining are:

1. Pre-Stabilisation
2. Processing & Segregation
3. Disposal of Segregated fractions of municipal solid waste

Pre-Stabilisation: The municipal solid waste from the heaps will be excavated and formed small heaps of 2 meters height known as windrows to get maximum surface area to volume. On windrows biocultures are sprayed for decomposition of biodegradable material like vegetable, food and garden waste etc. Usually windrows are turned 3-4 times on weekly basis in order to stabilize the waste.

The stabilization of waste results in

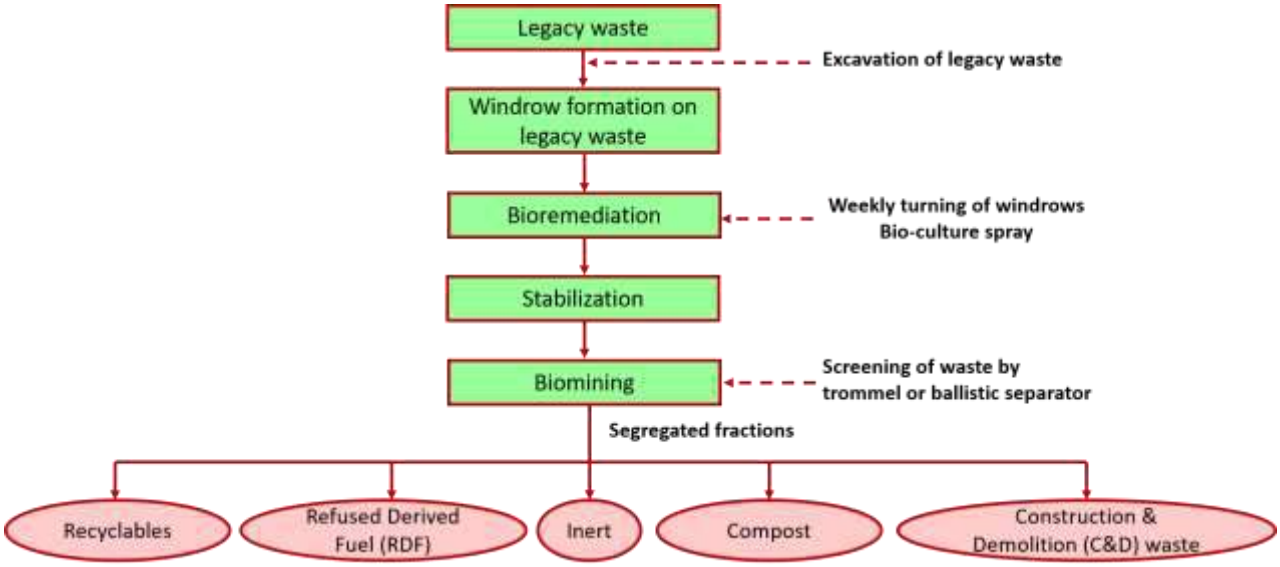
- Reduction of moisture to 25% to 30%.
- Complete decomposition of biodegradable material.
- Removal of foul odour and flies.
- No animal and bird scavenging.
- Destroy of pathogens.
- Escapes trapped gases.

Processing and Segregation: Once the process of bioremediation is completed for a period of 3 to 4 weeks; the stabilized material will be odourless and free flow in nature. The material will be fed into the trommels of 30 mm and 4 mm perforations to separate combustible, inert, construction & demolition waste and compost fractions. The fractions above 30 mm comprise combustible fractions with high calorific value and the material between 30 mm and 4 mm is inert, whereas the material below 4 mm is compost. The

combustible fractions can be used as boiler fuel in WtE facility and inert material can be used as filling material in low lying areas or disposed in sanitary landfill. The compost of size < 4 mm is used in agriculture as an organic fertilizer.

Figure no. 2.3 presents a generalized flow chart of the process that some of these mining projects employed. Screening of the excavated waste was the most common process used in the landfill mining.

Figure 2.3: Landfill Reclamation Process



The project seeks to improve and develop a socially and environmentally sustainable system of solid waste management which will reduce the associated environmental and public health risks.

2.7 PROJECT DESCRIPTION WITH PROJECT DETAILS

MSW can be managed through a centralized approach, a decentralized approach or a combination of the two. In our country both the approaches are in practice in different town and cities. A centralized approach will be adopted for treatment of Municipal solid waste in Gurgaon Faridabad cluster.

2.7.1 Basis of Cluster Formation

The quantity and composition of MSW generated in the ULB is essential for determining collection, processing and disposal options that could be adopted. They are dependent on the population, demographic details, principal activities in the city/ town, income levels and lifestyle of the community. While deciding the cluster data on current MSW generation, population projections, future MSW generation from domestic, commercial and industrial sectors and optimal transport distance etc.

Keeping the above criteria in mind Gurgaon Faridabad cluster is formed it consist of two ULBs, Municipal corporation of Gurgaon and Faridabad. Estimated MSW generation in Faridabad Cluster is about 1165 TPD. It is expected to reach 2100 TPD by 2035. Municipal Corporation Gurugram is the designated Gurugram Municipal Corporation for the cluster. The details about the population and waste generation for Gurgaon Faridabad cluster are given in Table 2.2.

TABLE- 2.2 EXPECTED WASTE GENERATION DETAILS OF GURUGRAM-FARIDABAD CLUSTER

SN.	ULB	Population projection for 2015	Waste Generation in 2015 (TPD)	Population projection for 2025	Waste Generation in 2025 (TPD)	Population projection for 2035	Waste Generation in 2035 (TPD)
1.	Gurugram	997785	449	1340940	603	1802111	810
2.	Faridabad	1591526	716	2138878	962	2874473	1290
Gurugram Faridabad Cluster		**2589311**	**1165**	**3479818**	**1565**	**4676584**	**2100**
Note:- Till the time waste generation quantity reaches to the designed value i.e. 2100 TPD, old waste will also be processed along with the fresh incoming waste to run the plant at full designed load							

Faridabad

Faridabad is the largest and the most densely populated district in Haryana. The city spans over an area of 742.9 Sq Km. and has a population of 1.79 million as per 2011 census. Municipal Corporation of Faridabad (MCF) is responsible for collection, transportation,

processing and disposal of all solid waste generated in the city, except untreated bio-medical waste and hazardous industrial waste, which is taken care of by the respective generators. Faridabad comprises of 3 towns namely Old Faridabad (Ward No. 22 – 34), Ballabgarh (Ward No. 1 – 4 & 35 – 40) and NIT area (New Industrial Township) (Ward No. 5 – 21).

Gurugram

Gurgaon is situated in the National Capital Region of New Delhi in the state of Haryana. Its total area is 1258 sq kms. Its population was 0.88 million as per 2011 census. The Municipal Corporation Gurgaon is divided into 4 zones, 35 wards. The coverage of wards under 4 zones is as follows:

- Zone 1: Ward no 8, 12, 19, 21, 22, 23, 24, 11, 20
- Zone 2: Ward no 1, 3, 4, 5, 6, 13, 14, 15, 16, 17, 18, 2, 7,9,10
- Zone 3: Ward no 29, 31, 32, 34, 35, 33
- Zone 4: Ward no 25, 26, 27, 28, 30

The details of the ULBs are given in Table 2.3.

TABLE- 2.3 ULBs AT A GLANCE

Particulars	Gurgaon	Faridabad
Number of wards	35	40
Number of zones	4	3
Number of transfer stations	3	5
Proposed transfer stations	2	0
Barat Ghar/ party lawns	45	39
Any religious/ cultural events/ Mela	24	2
Details of sabzi mandi, fruth markets, **wholesale grain/food market**	Main vegetable/ fruit market – khandsa road, gurudwara road, Silokhara, Sikanderpur,	3 big vegetable market • Ballabahgarh • Dabua colony NIT Fbd

Particulars	Gurgaon	Faridabad
Grain market – jacabpura	Chakkarpur, Badshahpur, Fazilpur, Tigra and Tikri	• Sector 16 A 55 retail sabzi mandis Grain market: • Nehru ground NIT Fbd • NH 2 NIT Fbd • Purani Anaj Mandi, Old Fbd
Details of large institutions/ commercial spaces	Large institution: More than 10 Commercial spaces: More than 7	Institutes: 2 institutes in greater FBD 50-60 big schools in Faridabad 1 university Commercial places:25 markets Malls:13 Hotels:27

2.7.2 Land Details & breakup of IMSWM with Waste to Energy Plant

Currently land is already used for the same purpose i.e existing integrated MSW management site. The land is owned by Municipal Corporation of Gurgaon. The proposed facilities will be developed inside the existing area.

The project will be developed as Integrated Solid waste site with the following facilities:

a) Waste to Energy Plant
b) RDF Plant
c) Composting Plant
d) Sanitary Landfill.

Details of the land breakup for present and for catering the future need are given in below-

TABLE 2.4 LAND USES BREAK UP OF PROPOSED FACILITY

Facility	Area (in sq m)	Area (in acres)	% of total land
Waste to Energy Plant Area	26580	6.56	21.57
MSW processing area	13590	3.35	11.03
Roads/ Amenities	11080	2.7	9
Sanitary Landfill	24680	6.0	20
Green Belt	40666	10.0	33
Drain/Sump	6634	1.6	5.4
Total	**123230**	**30.5**	**100**

FIGURE- 2.4 LAYOUT MAP OF THE AREA

2.7.3 Process Description

The activities planned in the project include collection, transportation, treatment & disposal of municipal solid waste in compliance to the MSW Handling Rules (2016) and generation of Power using waste to energy plant (RDF based). The basic concept for the solid waste management of the project site is presented in the form of the flow chart in shown in Figure no. 2.6. Brief description of the process to be followed is given below.

Source Segregation

Waste shall be segregated by waste generators into two fractions – wet fraction (green container) and dry fraction (blue container). The details of the waste to be dumped are provided in Table no. 2.5.

TABLE 2.5: WASTE BIN FOR SOURCE SEGREGATION OF WASTE

Wet Waste (Green Bin)	Dry Waste (Blue bin)
Food wastes of all kinds, cooked and uncooked, including eggshells and bones, flower and fruit wastes including juice peels and house plant wastes, soiled tissues, food wrappers, paper towels	Paper, cardboard and cartons, Containers and packaging of all kinds, excluding those containing hazardous material, compound packaging of all kind, Rags, rubber, wood, discarded clothing, furniture, Metals, glass (all kinds), Inert, house sweeping,

Primary Collection

Primary collection refers to the process of collecting waste from households, markets, institutions and other commercial establishments and taking the waste to a storage depot/ transfer station. Primary collection may be accomplished through the use of containerized push carts/tri-cycles, small mechanized vehicles, compactors and/or tipping vehicles.

For Gurgaon Faridabad Cluster, a combination of tricycles and light commercial vehicles with hydraulic tipping containers is proposed.

Following strategies are proposed to be adopted for effective Collection & Transportation:-

i. Promotion of the practice of segregation and storage of waste at source in two separate bins; one for Wet waste and another for Dry waste in order.
ii. To facilitate an organized and hierarchical system for waste collection and disposal, without letting the un-segregated waste to reach the secondary collection stages.
iii. Organization of door to door collection with community participation on cost recovery basis and minimize the multiple handling of waste, improvement in the productivity of labour and equipment.
iv. Containerized & covered secondary storage facilities and phasing out open storage.
v. Daily transportation of waste to the integrated MSW processing & disposal facility.
vi. Closed Container transportation using simple hydraulic system mounted vehicles.
vii. Awareness creation for source segregation and storage.
viii. Computerised Monitoring system to increase the productivity.

It is proposed that 70% of total households in Faridabad and Gurgaon shall be collected through mechanized vehicles (light commercial vehicles with hydraulic tipping containers) and the remaining waste (in narrow lanes/slums/undeveloped parts of the city) may be collected through tricycles. These vehicles shall also be provided with twin bin system to collect segregated waste. These will also be provided with modern Vehicle Tracking System (VTS) for close monitoring and precise movement as per pre-decided Route Maps.

Following Scheme is proposed for managing the collection and transportation mechanism in the cluster.

TABLE- 2.6 MANAGEMENT SCHEME FOR PROPOSED PROJECT

S. No.	Purpose	Proposed Vehicle/Equipment
1	Primary Collection & Transportation	Auto/Mini-Tippers
2	Secondary Collection Points	Fixed/Portable - Compacting Transfer Stations
3	Secondary Transportation	Refuse Compactors & Hook Loaders
4	For market places	Underground Bins, Litter bins

FIGURE- 2.5 VEHICLES & EQUIPMENT TO BE USE FOR COLLECTION & TRANSPORTATION ACTIVITY

Mini Tipper

Portable

Refuse Compactor

Hook Loaders

Secondary Storage

The current waste management system in Gurgaon ULB and Faridabad ULB employs bins of capacities 1.1 cum, 3 cum and 4.5 cum based on the current scenario, it may be proposed that bins of capacities 1.1 cum, 3 cum and 4.5 cum be placed on appropriate locations as designated by the respective ULBs.

Transfer Station

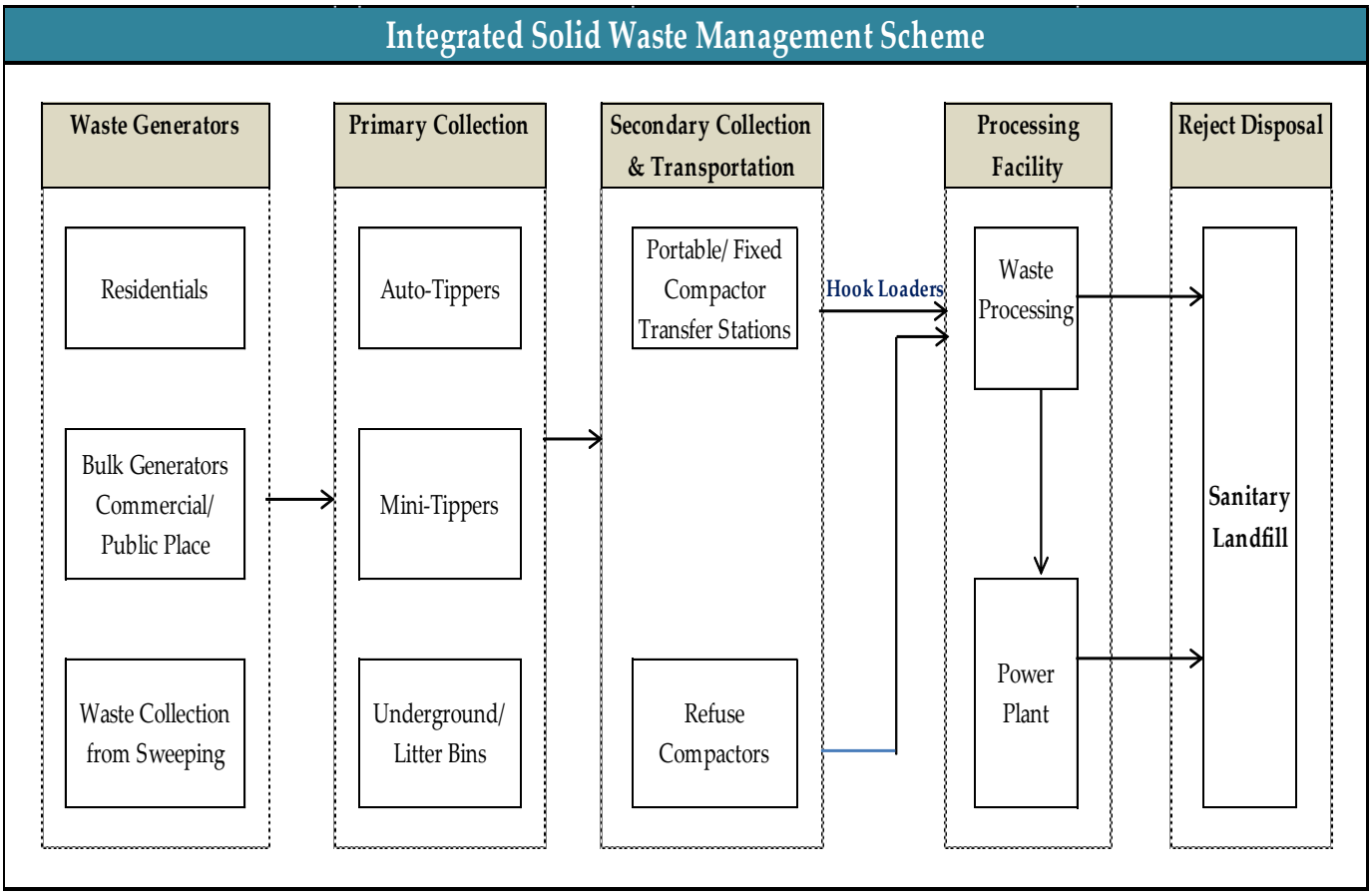
The transfer stations have been proposed so as to receive MSW from nearby ULBs coming in smaller vehicles and then transfer the MSW to a larger vehicle for transporting it to the processing facility (in refused compactor/larger transportation vehicle). MSW from the nearby locations are either to be delivered to the transfer stations or directly to the Processing Plant site depending, whichever is nearer. This method of transporting waste in bulk would help in reduction of the overall transportation cost and also substantially reduce the traffic and environmental nuisance associated with a large number of small refuse collection vehicles moving on the road.

Design Consideration for Transfer Stations Construction

In order to maintain the cleanliness, aesthetics and hygiene of Transfer Stations following points are considered;

- No open waste dumping.
- Waste collection through mechanized equipment only.
- Well designed and constructed platform and shed for housing waste collection equipment.
- Avoid nuisance by stray animals as no waste lies in open.
- Sanitizer to be sprayed to avoid mal-odour in the area.
- Greenbelt provision to be made in and around the periphery of transfer station.
- Leachate collection system to be provided to avoid any spillage of Leachate.

Figure no. 2.6: Methodology for Proposed Waste Collection



This concept has been developed keeping into considerations the following design criteria, for the design period of 20 years:

- Compliance to the SWM rules, 2016 for waste collection, transportation, treatment & disposal.
- Providing Door to door collection of waste from source in segregated manner with the introduction of 2-bin system (for wet waste and dry waste).
- Introduction of an efficient secondary waste collection & transportation system.
- Adapting the 4R's principal of waste minimization through reduction, reuse, recycle and recover. Hence, proposed a mechanism for recovery of recyclables at the Processing facility and waste reuse through composting of food waste and other green waste.

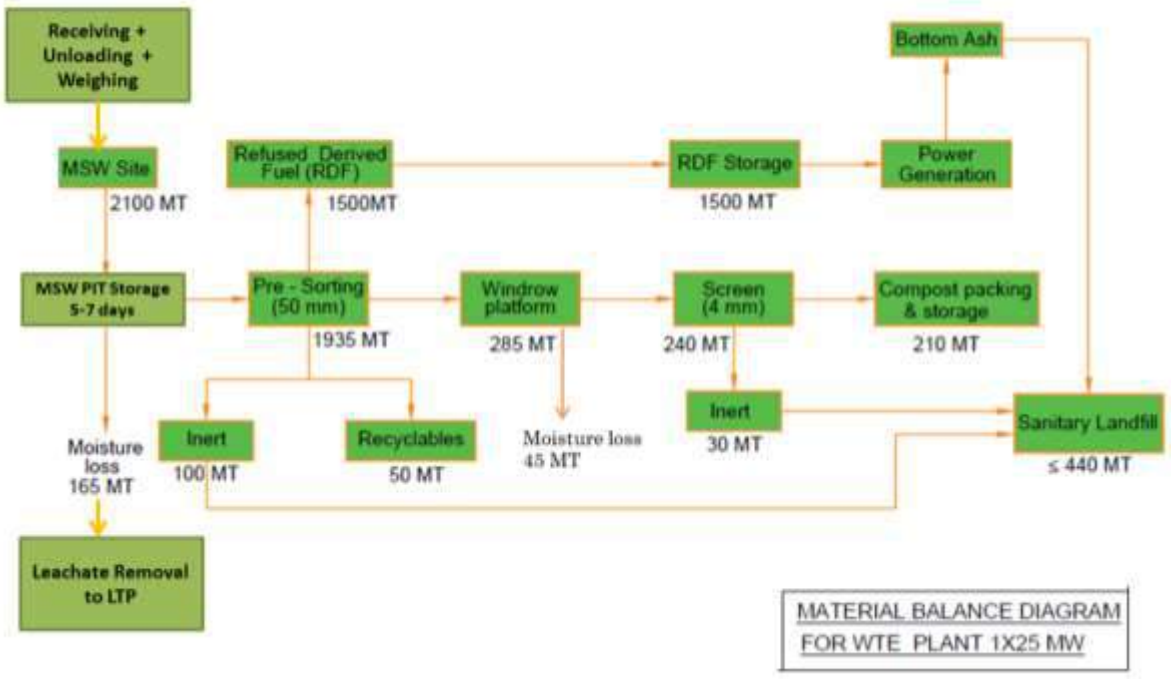
- Final disposal of only rejects/Inerts at the scientifically developed sanitary landfill with an attempt to dispose not more than 15-20% of the generated waste quantity at the landfill.

2.7.4 Municipal Solid Waste Processing

The municipal solid waste received at processing facility will be dumped in MSW pit and allowed for storage of about 5 to 7 days to remove moisture and leachate from the fresh municipal solid waste. The stored waste after completion 5 to 7 days duration, the waste will be fed into pre-processing system for segregation of various fractions of municipal solid waste. Municipal solid waste will be segregated into combustible, compostable, recyclable, and inert fractions. The designed capacity of the MSW processing facility is 2,100 TPD approximately. The MSW pre-processing system comprises either trommel or ballistic separator. The combustible fraction of waste will be used for generation of power through Waste to Energy (WtE) facility. Whereas the compostable fraction is used to produce compost through windrow composting process. The recyclable fractions will be recovered to generate revenue and the inert fractions will be disposed in sanitary landfill facility.

Proposed Scheme for Processing and Disposal of Municipal Solid Waste is shown below:

Figure no. 2.7: Process Flow and Mass Balance of Waste Processing Facility



Brief of MSW Processing

- MSW shall be unloaded inside the pit where in five to seven days retention shall be given to remove the excess leachate.
- After the leachate removal, primary segregation shall be undertaken to recover the RDF fraction (>50mm) for further storage. The compostable fraction of waste i.e. < 50 mm size will be shifted to windrow platform for composting. The inert removed through pre-processing system shall be directed to landfill.
- Windrow composting method shall be adopted for composting the compostable fraction of waste which is generated from pre-processing system.
- Leachate generated from MSW pit and windrow platform will be conveyed for treatment at Leachate Treatment Plant (LTP).
- The fraction of waste which is less than 50 mm consists of mixture of organic as well as Inorganic waste and shall be subjected to composting on windrow platform. After decomposition and stabilization of waste. The stablilized waste shall be fed into 4 mm trommel screens.

- During screening of stabilized waste at finishing section i.e. 4 mm trommel screen; material will be separated into two fractions. Material with size > 4 mm is inert and whereas the material < 4 mm size is compost. Compost will be packed and sold as fertilizer. The inert material will be directed to sanitary landfill for final disposal.

MSW Pre-Processing Plant Would Comprise of the Following Activity

a) MSW Weighing

Each truck carrying the municipal solid waste (MSW) will be visually inspected before it goes to a weighbridge. If the MSW vehicle contains a high percentage of unwanted materials, then it should not be accepted in the plant. For effectiveness, the drivers of the truck should also be provided with training on the different materials in the MSW and their uses. The weighbridge operator then instructs the driver to proceed to the unloading platform, where the driver unloads the waste in the designated area only.

b) MSW Receiving

The unloading platform will be at +7.0 m for unloading of waste into collection pit. Waste storage & processing of waste is in a completely cover shed, this complete shed area is maintained under negative pressure by sucking odour gases so that the foul smell can escape outside. The foul smell air sucked is used as combustion air in boiler.

The unloading platform will be arranged with the raw waste pit. The platform will be designed with an access for incoming and outgoing trucks. It will consist of unloading platform, TV monitoring equipment and water washing equipment.

The unloading platform will be designed with receiving doors for discharge of refuse trucks. Each truck unloading space will be installed with traffic lights for drivers to understand situation of each unload. The unloading platform shall be designed with CCD cameras for monitoring purpose. The refuse discharge operation can be seen from the control room for refuse cranes.

The waste pit shall be constructed with concrete and anti-seepage property. The bottom of the raw waste pit would be designed with leachate drainage ditch. The sides of the ditch shall be provided with iron grates. The pit bottom will be designed with 3% slope. The leachate in the pit shall be filtrated by the iron grate and then flows via the drainage into

the catch well where a blow down pump pumps the leachate and sprays into the Leachate Treatment Station.

The MSW will be unloaded in raw waste pit and mixed with grab crane while stacking the waste and it will be stored in raw waste pit for 5 to 7 days.

During the waste unloading by trucks in pit, the crane shall level and stack the waste suitably. After storing the waste shall be fed into a Hopper. Also, a hydraulic feeding arrangement shall be provided below the hopper to control the feed quantity of waste into primary trommel. Trommels with 50 mm sieve size will be installed for each raw waste pit. The primary trommels would segregate the raw MSW into RDF (of >50 mm), heavy inert and organic waste (of -50 mm size) size. The inert will be separately taken out through a belt and further segregated through manual sorting so that the combustible material may be recovered and taken into RDF line for further processing. Workers wearing proper mask, uniform, shoes and goggles will stand on each side of the conveyor to segregate the big size combustible.

c) Moisture Reduction

MSW will be stored in MSW storage pit for about 5-7 days to remove the moisture from the fresh municipal solid waste. The leachate generated from the MSW pit is conveyed to the drain by maintaining 3% slope on the platform of MSW pit. The leachate collected in MSW storage pit is transported to leachate treatment plant through pipeline for subsequent treatment.

d) Mechanical Segregation

After removal of moisture from the MSW storage pit. The partially dried material is fed into the pre-processing system with 50 mm sieve size with the help of grab cranes to separate combustible, compostable and inert fractions of municipal solid waste.

The combustible fraction of waste with size > 50 mm size is sorted and taken to RDF storage area. The organic waste with size < 50 mm is transferred to windrow platform for aerobic composting. Organic fraction of waste on windrow platform will be stacked in the form of heaps and shall practice frequent turning of waste till stabilization of waste. After

stabilisation of waste; material will be screened again by feeding into 4 mm trommel screen.

The material above 4 mm size consists of inert which will be disposed in sanitary landfill. Whereas the material below 4 mm size is compost.

e) Windrow Composting

The combustible fraction of waste with size > 50 mm size is RDF and sorted combustible material after manual sorting shall be taken on a common belt for RDF storage. The mixed waste which is < 50 mm size contains organic fraction. The organic fraction of waste will be processed through windrow composting methodology. The stabilization of waste takes place through aerobic composting process by maintaining optimum environmental conditions and spraying bio-culture for proper decomposition.

During the process of degradation of biodegradable material by certain micro-organisms in the presence of air, producing stabilized material. The process begins at an ambient temperature due to the activity of mesophilic bacteria which oxidize carbon to CO2, thus liberating a large amount of heat. Usually, the temperature of the waste reaches 50^0C within two days, which is the upper limit of temperature tolerance of mesophilic organisms. At this point the process is taken over by thermophilic bacteria and the temperature continues to rise. Biological digestion will be carried out by controlled aerobic process by successive populations of microorganisms (thermophilic enzymes) leading to development of stable temperature up to 65^0C to release carbon dioxide, minerals, organic substrate, energy and moisture. The aerobic process also helps to eliminate pathogenic bacteria weed seeds, larva etc. as a result of high temperature developed during the process. This system is much better than surface drying through hot air; it also works out cost effective. Moisture reduction (up to 20%) leading to free flow ability of waste and loosening of material for easy shredding is expected. Limited amount of free water may seep through the waste matrix and be collected through drains of the composting platform. Systematic turning of the material, which mixes the different components and aerates the mixture, generally accelerates the process of breaking down the organic fraction. Thus waste heaps will be turned once a week. After completion of entire process, waste will be shifted to finishing section for further screening.

f) **Curing Section**

The waste shifted from windrow platform shall be allowed for 2 weeks for complete maturation of the compostable fraction and to remove odour from the waste. After completion of curing phase, the material will also be free flow in nature which gives high yield of compost.

g) Refinement Section

The material from the curing section will be fed into refinement section which consists of 4 mm trommel screen. The material > 4 mm consists of inert and it can be disposed in sanitary landfill. Whereas the fine particulate matter < 4 mm size is compost.

As per compost quality norms nationally (FCO) and internationally, the compost should be below 4 mm average particle size and it should not contain impurities such as glass, plastic, other inert material etc. which spoils the overall appearance and creates suspicion in the mind of the end user about quality of the final product. To achieve this, a refinement section will be incorporated in the machine line.

h) Compost Packing and Storage System

The mechanized packing section can do the bagging, weighment and stitching of 50 kg bags and finally stacked in the finished product store by using a stacking conveyor.

2.7.5 Proposed Waste to Energy Plant

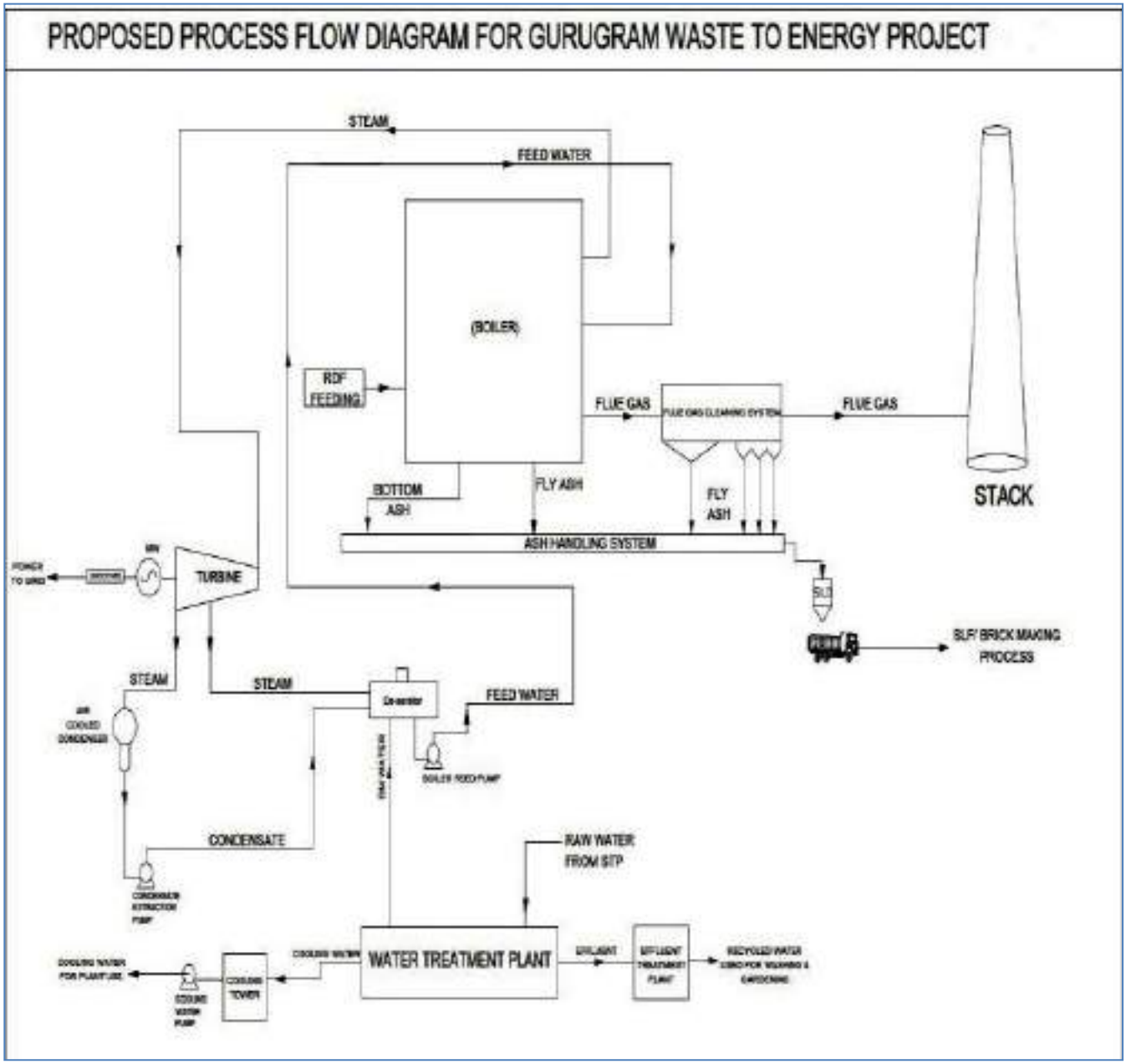
Waste to energy plant of 25 MW capacity is proposed to be setup utilizing RDF as main fuel based on Grate Technology with natural circulation drum type water tube boiler- Grate type boiler.

The incineration system consists of feeding system, grate system, incinerator system, flue gas cleaning system, ash handling system, and safety equipment. Also each incineration line is equipped with an independent hydraulic system to provide liquid power for on-line equipment.

Table no. 2.7: Components of Proposed Waste to Energy Plant:

Unit Description	Capacity
2 No. Boiler,	750 tpd each
1 No. Turbo Generator set of 25MW	25 MW
Air Cool Condenser	
Power Switch yard	
Auxiliary Power Supply System	
Control Panel & Instrumentation Area	
Process Water Conveyance Pipeline	
Raw Water Treatment Plant (DM plant)	
Flue gas Purification System	
Continuous Emission Monitoring System	02 No.
Chimneys / Stack for Flue Gas emission -60 Mtr.	02 x 60 Mtrs/Each
Leachate Treatment Plant	500 KLD
Reject Management System	
Firefighting System	
Administration/ office building, Workers area, Canteen and security office.	
Green Belt -3 Tier	33%
Sewage treatment Plant	
RO/UF/Demineralization Plant	
DTRO	
Ash Pond	
RDF storage	For 3 Days
HFO/HSD storage	02 x 30 M3
SWAS Laboratory	01 no
Bag Filter & Ash Silos	

Figure 2.8: Process Flow Diagram of Waste to Energy (WTE) Plant for Gurugram



Grate Technology

Combustion is a thermal process for waste treatment where processed waste (RDF) can be used as boiler feedstock. Combustion is the most popular waste treatment method that transforms waste materials into useful energy. Grate technology with robust MSW processing equipment (prior to fuel feeding to the boiler) meets the criteria under SWM Rules 2016.

Different types of combustion technologies such as travelling grate, reciprocating grate, reciprocating forward feed grate and circulating fluidised bed have been used globally including in India. Travelling grate is the viable option and simple to operate. However, it requires fuel to be of consistent quality having low level of moisture and inert. The figure below illustrates a typical configuration of a well-designed and environment friendly grate technology based power project.

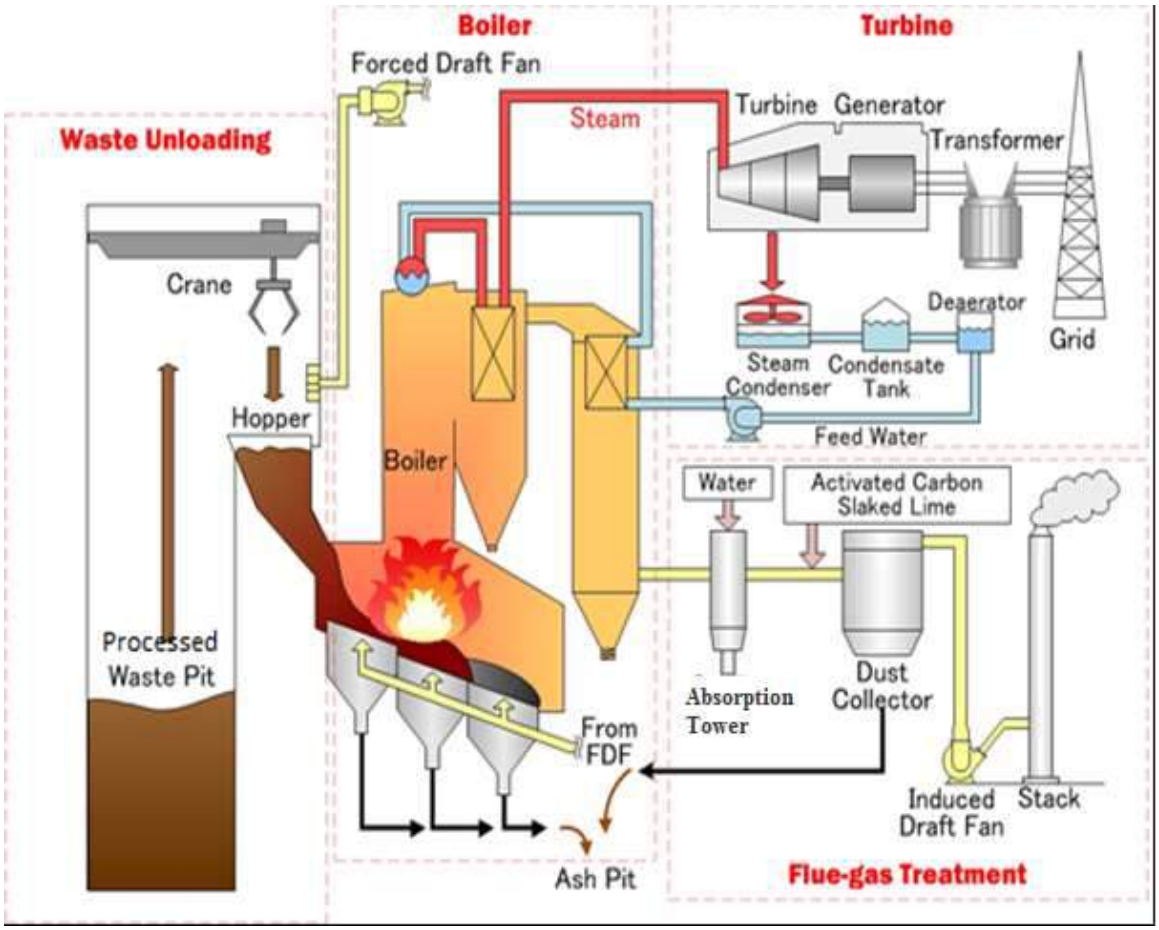
Benefits of Grate Technology

The following features of Grate technology are suitable for MSW firing:

- Excellent capability of low quality fuel: Ability to handle wide range in respect to moisture & calorific value of waste. It can burn very low quality MSW with a heating value of less than 4.2 MJ/kg and without any auxiliary fuel.
- Effective control of pollutants: Combustion takes place in the bed at about 850°C and the average gas residence time is high (>2 seconds) resulting in effective combustion and thus destroy toxic species in the MSW and reduce the formation of pollutants, such as CO, NOx and complete destruction of dioxin and furan.
- NOx and SO2 emissions are significantly decreased without special environmental modifications.

Outstanding load adjusting capability: The waste treatment load of a Grate Boiler can be adjusted from 60% to 110% with stable combustion.

Figure no. 2.9: Indicative Process Flow for waste to energy of 25 MW plant (2x 750 tpd) Schematic of Grate Combustion Technology



Calorific Value of Waste for Design purpose

The design point of the calorific value of the waste is related to the operating efficiency and operating cost during the life of the waste incineration plant. If the design point is set too low, in order to meet the thermal load requirements of the incinerator, the waste treatment capacity will decrease; otherwise, if the design point is set too high, the furnace volume heat load will remain at a low level for a long time, which will cause operational difficulties and increase operational costs. The setting of LHV of MSW should not only depends on the current heat value of MSW, but also depends on the improvement of living standards. The heat value of MSW will remain basically unchanged after rising to a certain value. At the same time, changes in MSW collection and classification methods, seasonal changes in the

same year, sunny and rainy days, and other factors will affect the calorific value of the MSW.

The basic principles of selecting the design LHV of MSW are:

1. The calorific value of MSW will generally increase slowly. During the operation period of 25 to 30 years, the calorific value of MSW is lower in the earlier period and higher in the later period;
2. The whole plant's operating efficiency and the rationality of equipment configuration during the life period should also be considered;
3. Not only does the calorific value of MSW vary with the year, but also with the seasons each year. The calorific value of MSW is the lowest in the summer and highest in autumn and winter. It is necessary to ensure that the incinerator can operate stably within the fluctuation range of the calorific value of MSW.
4. MSW collection and transportation and the conditions in the MSW storage pit will change the moisture content of the MSW, and then affect its calorific value.

After entering the incineration plant, the MSW is unloaded into the storage pit, and then stored in the pit for 5 days before being incinerated. The physical and chemical properties of the MSW will change greatly after storage and the amount of leachate precipitated in the storage pit can reach 10% to 25%. Under the uncertain boundary conditions, the calorific value of MSW after the leachate is separated out can be estimated as that MSW calorific value increases by 104 kJ / kg for each 1% reduction in the leachate.

Therefore, the calorific value of the waste should be considered in advance, and the change range of the calorific value of the waste should be determined according to the current fluctuation of the calorific value of the waste.

Table no. 2.8 The MSW analysis report of Gurgaon is shown in the following table

Parameters	Test Method	Unit	Average
Proximate Analysis			
Moisture	IS 9235 :1979	%	47.81
Total Ash	IS 1350 P:1	%	20.05

Volatile Matter	IS 10158	%	24.15
Fixed Carbon	IS 228 P-1	%	7.99
Ultimate Analysis			
Moisture	IS 9235 :1979	%	47.81
Total Ash	IS 1350 P:1	%	20.05
Carbon Content	ASTM D 3178-89	%	20.74
Hydrogen	ASTM D 3178-89	%	3.02
Sulphur	IS 228 P-9	%	0.38
Oxygen	ASTM D 3176-89	%	7.23
Nitrogen	ASTM D 3179-89	%	0.81
GCV (on air dry basis)	Bomb calorimeter	Cal/gm	2038.80
NCV (on air dry basis)	Bomb calorimeter	Cal/gm	1718.80
GCV (on receive basis)	Bomb calorimeter	Cal/gm	943.57
NCV (on receive basis)	Bomb calorimeter	Cal/gm	883.94

According to the above report of Gurgaon MSW, the current average calorific value of waste is 885kcal/kg. Based on the average leachate removal rate of 15%, the average calorific value of MSW entering the furnace will be about 1260kcal/kg.

Table no. 2.9 MSW – RDF (for fresh waste) analysis report of Gurgaon is shown in the following table:

Parameters	Test Method	Unit	Average
Proximate Analysis			
Moisture	ASTM D 3173-87(1996	%	35.4
Total Ash	ASTM D 3174-97	%	20.08
Volatile Matter	ASTM D 3175-89a(1997	%	24.56
Fixed Carbon	ASTM D 3172-89(1997)	%	19.96
Ultimate Analysis			
Moisture	ASTM D 3173-87(1996)	%	35.4
Total Ash	ASTM D3174-97	%	20.08
Carbon Content	ASTM D 3179-89(1997)	%	22.01
Hydrogen	ASTM D 3179-89(1997)	%	5.87
Sulphur	ASTM D 3177-89(1997)	%	0.92
Oxygen	ASTM D 3179-89(1997)	%	15.02
Nitrogen	ASTM D 3179-89(1997)	%	0.7
GCV (on air dry basis)	Bomb calorimeter	Cal/gm	2477
NCV (on air dry basis)	Bomb calorimeter	Cal/gm	1962
GCV (on receive basis)	Bomb calorimeter	Cal/gm	1600
NCV (on receive basis)	Bomb calorimeter	Cal/gm	1267.9

Table no. 2.10 MSW – RDF (for legacy waste – existing old dump) analysis report of Gurgaon is shown in the following table:

Parameters	Test Method	Unit	Average
Proximate Analysis			
Moisture	ASTM D 3173-87(1996	%	12.88
Total Ash	ASTM D 3174-97	%	21.43
Volatile Matter	ASTM D 3175-89a(1997	%	40.07
Fixed Carbon	ASTM D 3172-89(1997)	%	25.62
Ultimate Analysis			
Moisture	ASTM D 3173-87(1996)	%	12.88
Total Ash	ASTM D3174-97	%	21.43
Carbon Content	ASTM D 3179-89(1997)	%	44.08
Hydrogen	ASTM D 3179-89(1997)	%	5.81
Sulphur	ASTM D 3177-89(1997)	%	0.62
Oxygen	ASTM D 3179-89(1997)	%	14.89
Nitrogen	ASTM D 3179-89(1997)	%	0.29
GCV (on air dry basis)	Bomb calorimeter	Cal/gm	2645
NCV (on air dry basis)	Bomb calorimeter	Cal/gm	2264
GCV (on receive basis)	Bomb calorimeter	Cal/gm	2304
NCV (on receive basis)	Bomb calorimeter	Cal/gm	1972.4

Considering the calorific value of RDF especially Legacy Waste-RDF, it is recommended that the design LHV of the MSW in the project is 1400kcal/kg. The range of LHV is 4187kJ/kg～8374kJ/kg (1000kcal/kg～2000kcal/kg). As per the above, the technical specification of recommended/proposed boiler for the project is given below:

Table no. 2.11: Technical Specifications of Boiler

Specifications	Unit	Values
Type of boiler	**-**	**Natural circulation drum type water tube**
BMCR	**t/h**	**58 per boiler**
Pressure of main steam	**MPa**	**4.0**
Temperature of main steam	**℃**	**400**
Temperature of Economizer inlet	**℃**	**130**
Air temperature	**℃**	**35**

Continues blowdown rate	%	1
Flue gas temperature at boiler outlet	℃	190
Boiler guarantee efficiency	%	≥80
GCV of RDF	cal/gm	1200-1400

Table no. 2.12: Technical Specifications of Incinerator

Specifications	Unit	Values
Type of incinerator	-	Mechanical Grate
Rated waste treatment capacity	t/d	750
Max. waste treatment capacity	t/d	862.5
NCV for design	kcal/kg	1400
Range NCV of waste	kcal/kg	1000~2000
Min. NCV without auxiliary combustion	kcal/kg	1100
Temperature in the furnace	℃	≥850
Residence time in the fluegastemperature≥850℃	s	＞2
Air excess coefficient	/	1.8
Mechanical load range of Grate	%	60~115

2.7.6 Flue Gas Cleaning/Purification System

Pollutants in MSW incineration flue gas can be divided into particulate matter (dust), acid gases (HCl, HF, SO2, NOx, etc.), heavy metals (Hg, Pb, Cr, etc.) and organic highly toxic pollutants (dioxins, Furan, etc.). In order to prevent pollution to the environment during the waste incineration process, strict measures must be taken to control the emission of waste incineration flue gas by using a flue gas purification system.

Flue gas Purification System refers to a range of processes imposed on untreated combustion gas to limit harmful pollutants such as emissions of dust, acidic gases, heavy metals, and dioxins.

According to the flue gas parameters of the waste heat boiler outlet, the flue gas purification system of the project adopts the following process:-

a) "SNCR furnace denitration system
b) Semi-dry flue gas deacidification tower
c) Dry powder injection adsorption system
d) Activated carbon injection adsorption system
e) Bag filter

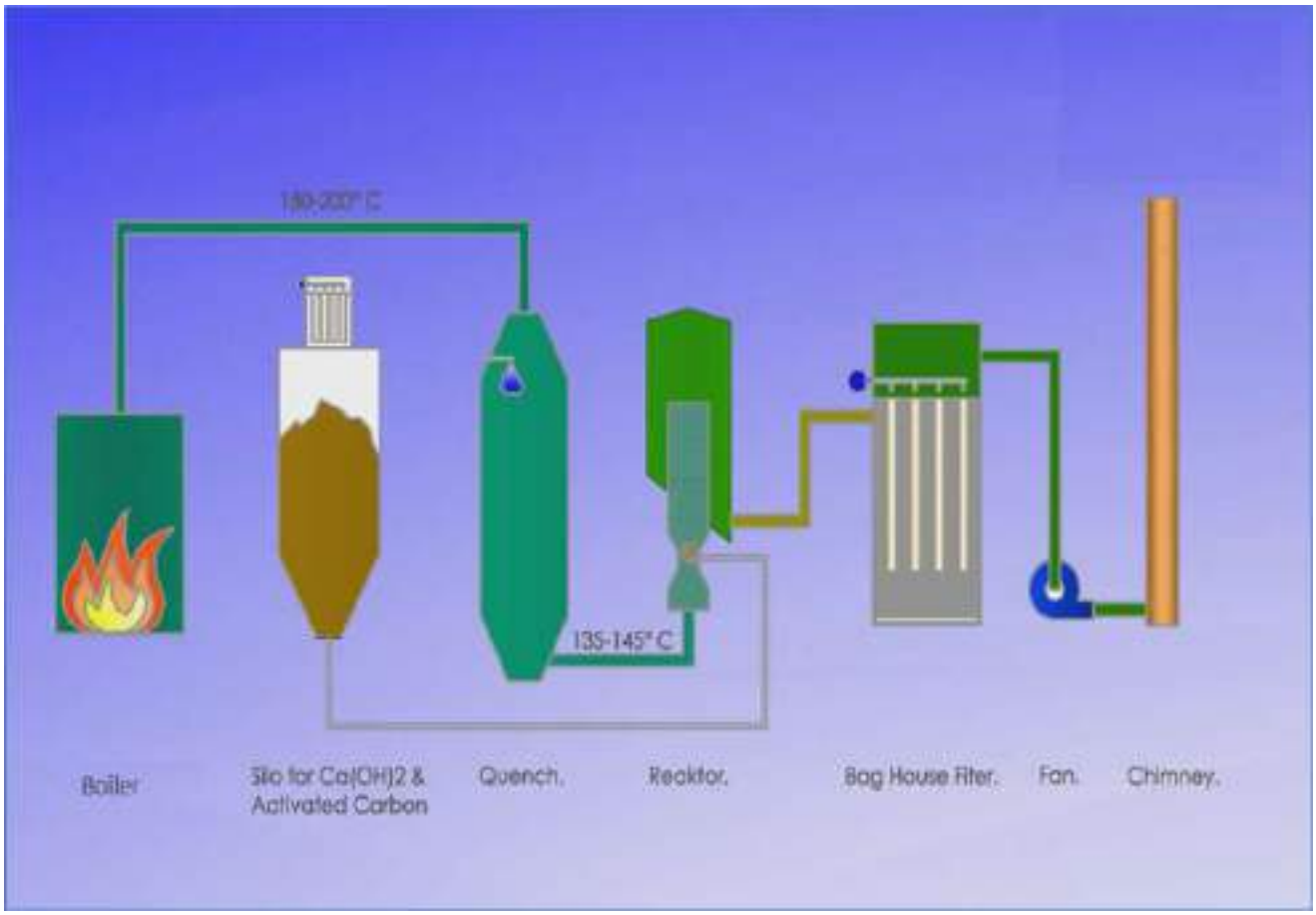
Removal of above components requires two processes physical and chemical. Generally, the particulate matter is removed by the physical process and other items are removed by chemical reaction or by adsorption at the surface of the activated carbon or fabric filters. There is a number of equipment that has to cater to the emission and it is not possible by the use of single specific equipment.

Selection of Technology/Combination of equipment's technologies proposed to be used to clean the flue gas to achieve the prescribed norms is as tabulated here under:

Flue gas constituent	Selected Technology	Description
NOx Control	SNCR System & Maintaining combustion temperature	Reduction of NOx using selective non-catalytic reactions (20% concentration ammonia as reducing agent). Boiler combustion control allows the bed temperature to be limited to 850 ^{0}C, thus formation of the NOx is limited as per the selection of the technology.
Gaseous contaminants removal	Semi Dry Deacidification Tower	Dry adsorption system using hydrated lime to control all fugitive emissions.
Auxiliary system to deacidification	Dry Powder Injection Adsorption	To improve the deacidification efficiency by using dry powder lime
Particle removal	Bag filter	Bag filter are capable of meeting the emission norms, the use of bag filter is to remove the particulate matter (SPM) as per SWM rules 2016.
Dioxins/furans	Injection adsorption	Dioxins and Furan completely

Flue gas constituent	Selected Technology	Description
	of activated carbon	disintegrate into harmless compound at ≥ 850 ^{O}C, if the residence time provided for flue gases in the furnace zone kept more than 2 sec. Reformation of the Dioxins and Furans after leaving the furnace is controlled effectively by rapid quenching of Flue Gases in the downstream of the furnace by providing a large heat exchange area (furnace water walls, bank Tubes, super heaters and economizers) for quick cooling of flue gases. Control is done by means of adsorption on pulverized activated carbon which is injected before the bag house filter chamber in the Reactor. Slaked lime will also be injected into the reactor
Emissions from Stack	Real time Online Continuous Monitoring System	Online continuous monitoring System will be installed for monitoring, controlling & maintaining emissions as per CPCB guidelines.

FIGURE- 2.10 FLUE GAS TREATMENT TECHNOLOGY



a. Control of NOx

- NOx formation takes place in furnace when the combustion temperature exceeds 900 ˚C.
- Boiler is designed and operationally controlled to operate within 850-900˚C.
- Reduction of NOx using selective non-catalytic reactions (SNCR) and 20% diluted concentration ammonia as reducing agent.

b. Semi Dry Deacidification Tower

The flue gas at the outlet of the boiler passes the flue gas distributor (volute) provided on the top of the reaction tower to guide the flue gas into the semi-dry reaction tower equipped with a rotary sprayer. Mix thoroughly in the reaction tower. The fine droplets react with the pollutants such as sulfur dioxide,

hydrochloric acid and hydrofluoric acid in the flue gas to absorb SO2, HCl and HF in the flue gas.

At the same time as deacidification, the flue gas temperature dropped from about 190-230 ℃ to 140-150 ℃. Part of the dry product consisting of fly ash and reaction products falls into the bottom of the adsorption tower body and is discharged into the ash transport system. Each incineration line is equipped with a semi-dry reaction tower deacidification system.

c. Dry Powder Injection Adsorption

In order to ensure deacidification efficiency in the state dry powder injection system will be installed to meet the emission index requirements, dry powder injection system will be installed. The two sets of flue gas purification systems in this project share one dry powder injection system,which is used as auxiliary system for normal deacidification system.

The dry powder reacts with the acid gases (SO2, HCl, etc.) in the flue gas to further ensure that the acid gas concentration is lower than the emission standard.

d. Activated Carbon injection adsorption

Dioxins and Furan completely disintegrate into harmless compound at ≥ 850 ^{0}C, if the residence time provided for flue gases in the furnace zone kept more than 2 sec.

Reformation of the Dioxins and Furans after leaving the furnace is controlled effectively by rapid quenching of Flue Gases in the downstream of the furnace by providing a large heat exchange area (furnace water walls, bank tubes, super heaters and economizers) for quick cooling of flue gases.

However, traces of Dioxins/Furans are effectively captured and removed in Flue Gas Treatment System, installed downstream of the boiler which includes activated carbon injection adsorption system.

- The activated carbon sprayed into the outlet duct of the reaction tower must be uniformly mixed with the flue gas and have a sufficient contact time to achieve higher purification efficiency.
- After the activated carbon powder enters the bag type dust collector with the flue gas, the activated carbon powder staying on the filter bag continues to be

in full contact with the flue gas slowly passing through the filter bag, and the dioxin and heavy metal ions in the flue gas are purified to the maximum.

e. Particle Removal System- Bag Filters

Bag filters are called fabric (porous) dust collectors which are proposed to be used to remove the dust from the flue gas. A Bag Filter is envisaged after Dry scrubber. The purpose of putting Bag Filter is to remove the Dust, HF, HCL & SO2 emissions as per SWM rules 2016. Plant designed to comply all rules & directions of SWM Rules 2016 & NGT orders.

The dust-laden air enters Bag filters. The dust is accumulated on filter elements while the air passes through the filter bags from outside to inside. Dust particles from the flue gas will form the layer over the bags. This layer is called cake, this will enhance the further filtration. The accumulated powder is dislodged from the bags by reverse pulsejet air intermittently. The dislodged powder falls on bottom cone and is discharged through powder discharge valves. The dust free air is sucked by induced draft fan and is exhausted to atmosphere through chimney.

The flue gas purification process system meets the stricter flue gas emission standards of SWM Rule 2016. The flue gas emission index of this project is shown in the following table: in terms of dry base, O_2 content 11%.

TABLE NO.2.13: FLUE EMISSION INDEX OF THE PROJECT

No.	Parameter	Unit	SWM Rule, 2016 & its subsequent amendments	
			Daily averages	Half hour averages
1	Dust	mg/Nm^3	—	50
2	HCl	mg/Nm^3	—	50
3	HF	mg/Nm^3	—	4
4	SO_2	mg/Nm^3	—	200
5	NOx	mg/Nm^3	—	400

6	CO	mg/Nm³	50	100
7	TOC	mg/Nm³	—	20
8	Hg	mg/Nm³	0.05	
9	Cd	mg/Nm³	—	—
	Cd+T1		0.05	
10	Pb	mg/Nm³	—	—
	Pb+Cr Heavy metal		0.5	
11	(TEQ) Dioxin	ng-TEQ/Nm³	0.1	

The flue gas of each incineration line is treated by the flue gas purification system (FGCS) and discharged into the chimney/stack by the induced draft fan. The height of the chimney/stack will be 60m.

2.7.7 Sanitary Landfill (SLF)

The rejects consisting of non-biodegradable, non-recyclable, non-combustible Inert and residues from MSW process plant & unutilized ash from Waste to energy plant will be dumped in the scientifically designed sanitary landfill site 'SLF". The SLF will be constructed within ISWM facility premises.

Landfill sites will be designed conforming to the criteria given in Schedule-1 of the Solid Waste Management Rules 2016 detailed as under:

- Selection of landfill sites will be based on examination of environmental issues.
- The sanitary landfill site will be planned, designed and developed with proper documentation of construction plan as well as a closure plan in a phased manner.
- The landfill sites will be selected to make use of nearby wastes processing facilities.
- Landfill sites will be set up as per the guidelines of the Ministry of Urban Development, Government of India and Central Pollution Control Board.
- The existing landfill sites which are in use for more than five years will be improved in accordance with the specifications given in this Schedule.
- The landfill site will be large enough and will develop 'landfill cells' in a phased manner to avoid water logging and misuse.
- The landfill site will be 100 meter away from river, 200 meter from a pond, 200 meter from Highways, Habitations, Public Parks and water supply wells and 20 km

away from Airports or Airbase. Asola Wildlife Sanctuary is located at 300 meters approx from the project site. However, in a special case, landfill site may be set up within a distance of 10 and 20 km away from the Airport/Airbase after obtaining no objection certificate from the civil aviation authority/ Air force as the case may be. The Landfill site will not be permitted within the flood plains as recorded for the last 100 years, zone of coastal regulation, wetland, Critical habitat areas, and sensitive eco-fragile areas.

- The sites for landfill and processing and disposal of solid waste shall be incorporated in the Town Planning Department's land-use plans.
- A buffer zone of no development will be maintained around solid waste processing and disposal facility, exceeding five tones per day of installed capacity. This will be maintained within the total area of the solid waste processing and disposal facility. The buffer zone will be prescribed on case to case basis by the local body in consultation with concerned State Pollution Control Board.

Considering these aspects, the landfill development strategy for Gurugram-Faridabad cluster is formulated, to satisfy the regulatory requirements of MoEF and the guidelines of CPHEEO, with the following objectives.

- Environmental Protection and protection from the flooding
- Physical Acceptability
- Technical Standards of Site Engineering Required
- Operational and Management Standards Desirable
- Appropriateness and Sustainability of the Method
- Volumetric Capacity of the Site
- Longevity of the Method and
- Cost Effectiveness of the Recommended Measures

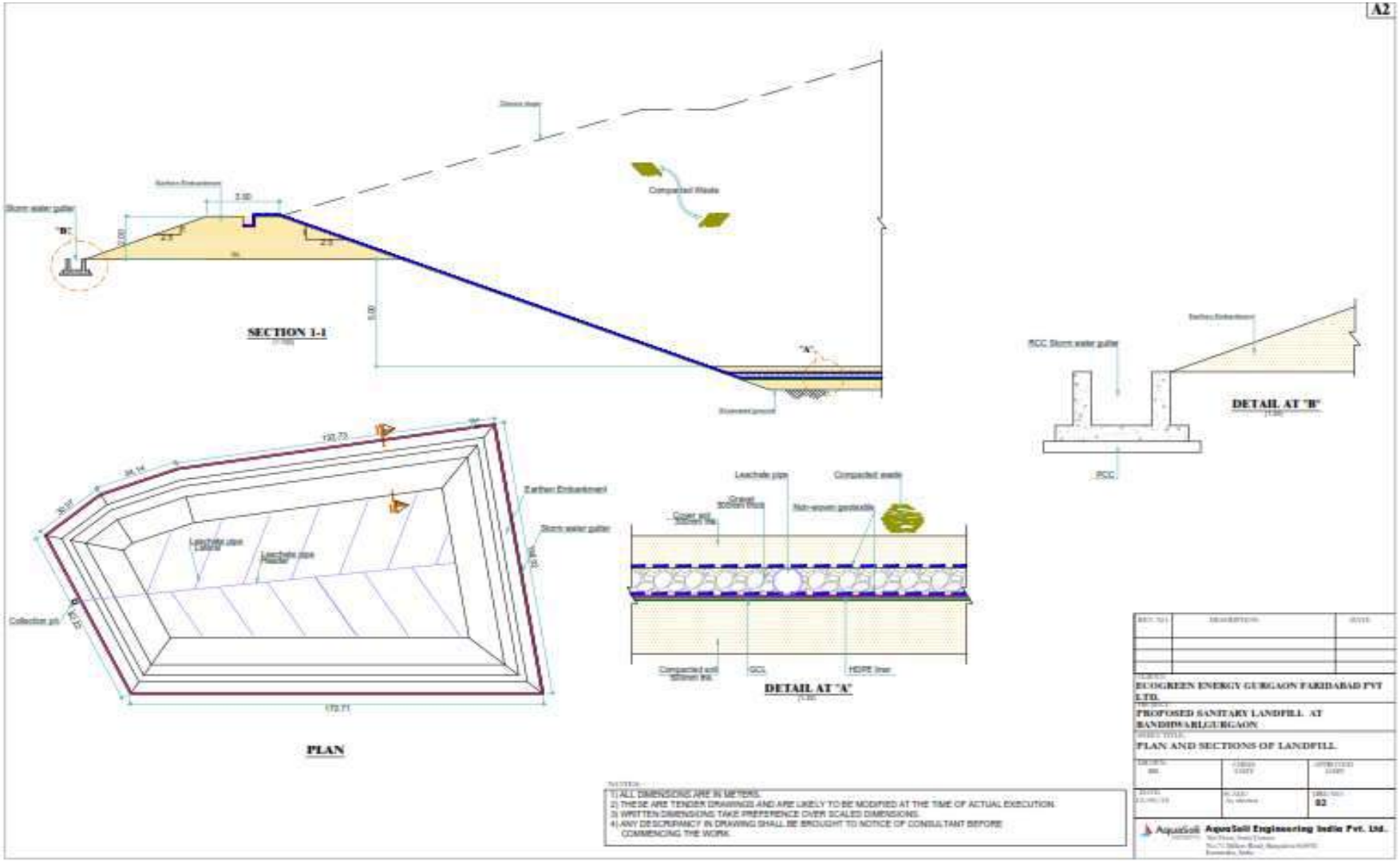
Recommended Measures of Containment Engineering

Protection of surrounding environment of landfill site is effectively achieved through segregation and isolation of potentially polluting waste, from the surrounding strata of surface water and ground water. The principle means of achieving this are, provision of

sealing layers at the base, side walls and top of the landfill. Appropriate and secure operational management of the site to minimize the following aspects will further supplement these measures.

- Water ingress into the landfill.
- Leachate generation and uncontrolled dispersion and
- Accumulation and uncontrolled release of land fill gas into the surrounding atmosphere.

Figure 2.11: Plan & Section of Landfill



A number of alternative methods are available for constructing sealing and containment layers with varied demands for expertise levels both for liner formation and installation.
The landfill composite liner with the following specifications has been recommended complying with the guidelines of SWM Rules 2016 and CPHEEO.

- A 900 mm thick layer of compacted clay or amended soil (with bentonite) of permeability of not greater than 1 X 10-7 cm/sec.
- A HDPE geomembrane liner with thickness of 1.5 mm.
- A Geotextile membrane of 500 gsm.
- A 300 mm thick granular drainage layer with permeability not less than 10-2 cm/sec.

It is to be noted that no industrial or biomedical wastes are allowed to mix with the solid waste being disposed off at the site. The mix of any of these wastes will render the waste hazardous there by requiring the use of highly expensive synthetic liners for containment.

2.7.8 Leachate Management System

Leachate is the water-based complex liquid, comprising of innumerable organic and inorganic compounds, which percolates through waste heap and accumulates at the bottom. Leachate when escapes to nearby environment poses an enormous threat to the groundwater and surface water contamination hence making the process of Leachate Management exceptionally critical.

While the characteristic of leachate depends considerably on the waste deposit, age of the landfill, temperature and moisture content, it is significantly concentrated in terms of toxic chemicals and thus the treatment of leachate becomes crucial in preventing the high-risk contamination.

Leachate management follows the hierarchal procedure comprising of followings:

a) Leachate Collection & Treatment: by incorporating proper drainage system to collect the leachate from the bottom and efficiently treating to comply with the standards before disposing the treated liquid waste into streams.

b) Leachate Minimization: by re-circulating the collected leachate onto the

composting heap.

Capacity of Leachate Treatment Plant

Considering waste processing of 2100 TPD and waste incineration capacity of 2x 750 TPD and other wastewater from the plant, capacity of Leachate Treatment plant is 500 m3 per day (2x 250m3/d) i.e 500 KLD as per following estimate.

TABLE NO. 2.14 WASTEWATER GENERATION

Source of Wastewater	Quantity (m3/h)	Quantity (KLD)
Leachate	15.6	374.4
Flushing water of Platforms	1.2	28.8
Sanitary sewage	0.4	9.6
Total Wastewater Generation	-	**412.8**
Design capacity of LTP	-	**500**

Leachate, effluent from the plant and sewage will be collected and treated in treatment plant as per norms of CPCB/HSPCB, SWM Rules 2016. The treated water will be reused for in reaction tower flue gas water, roads washing, greening water, slurry preparation, cooling water, and flushing water between discharge rooms.

Leachate Treatment Plant - Process Description

The leachate treatment process flow as follows:

Leachate Collection Tank → Grille → Equalization Tank → UASB Anaerobic Reactor → MBR Reactor (A/O process + Ultra Filtration UF) → Nano Filtration (NF) → Reverse Osmosis (RO) → Water to Reuse Tank and Sludge for incineration after drying.

The description of important facilities is as follows:

1. **Collection Tank:**

Effluent will be received at the inlet of the coarse bar screen to trap any floating particles and debris. The screened effluent overflows in to the equalization tank.

2. **Equalization Tank**

The equalization tank plays the role of regulating quality and quantity and buffer in the system. The setting of the equalization tank has a great effect on the stability of the entire system.

3. Up-Flow Anaerobic Sludge Bed Reactor (UASB):

The anaerobic reaction needs to be carried out at medium temperature i.e 33-38℃. The anaerobic digestion system is heated by mixing water with steam, to ensure the suitable temperature conditions for the anaerobic reaction. The wastewater in the equalization tank is mixed with steam through a pipe mixer, and is pumped into a medium temperature anaerobic reactor. Under the action of microorganisms, most of the organic matter in the wastewater is transformed into such as methane, carbon dioxide, water, etc by anaerobic nitrification. Discharge system in the form of biogas.

4. Anoxi/Oxic Tanks:

The treated water from anaerobic reactor flows to the A/O biochemical tank. After the pollutants such as C, N in the mixed wastewater are removed under the action of microorganism, the mixture is pumped to the UF system for sludge and water separation. The liquid was stored in the ultrafiltration tank, the sludge was refluxed to the biochemical tank, and the excess sludge was discharged to the sludge storage tank.

The biological reaction takes place in the aeration tank where incoming BOD and COD will be reduced to greater than 90%. Air Blowers are provided to maintain an adequate air flow in aeration tank and equalization tank. Air diffusers supply oxygen for biochemical processes as well as mixing sewage with return sludge from the settling tank. An Air Pump delivers air to a battery of Fine Bubble Diffusers at a constant rate thereby ensuring that attached micro-organisms developing rapidly.

5. Ultra Filtration (UF) system:

After A/O biochemical treatment, the treated water enters the UF system for further treatment and sludge separation. Operation of the Ultra filtration unit will be completely automated. Service & backwash sequence will be controlled by procedure in the control panel. The integrated equipment is used to be concentrated in the membrane treatment workshop.

6. Nano Filtration (NF) System:

The treated water of the UF system is further treated in depth, and most of the two valence ions and molecular weights are removed to 200-1000 of the organic matter, and a small amount of monovalent ions can be removed by Nano filtration. The integrated equipment is used to be concentrated in the membrane treatment workshop.

7. Reverse Osmosis (RO) system:

The RO treatment unit can not only remove the organic matter and suspended matter in wastewater but also remove the salt content. The integrated equipment is used to be concentrated in the membrane treatment workshop.

8. Sludge Processing:

The sludge discharged from the UASB anaerobic reactor, sedimentation tank and MBR ultrafiltration first enters the sludge tank and is transported to the sludge concentration tank by the sludge pump. After the sludge is dehydrated by the sludge dehydrator, the sludge moisture content is reduced to 75-80%, and then sent to the waste storage pit for incineration. After dewatering, the supernatant was returned to the first stage de-nitrification tank.

The excess sludge stored in the sludge storage tank was raised to a centrifugal dehydrator by a pump to dewatering the sludge mechanically. The sludge was mixed with flocculent before dewatering in order to improve the dehydration performance. After dewatering the sludge is sent to RDF plant and then incinerated with garbage. Filtrate water recovered by decanting process will be send to equalization tank by gravity.

FIGURE- 2.12 LEACHATE TREATMENT SCHEME (PROCESS FLOW DIAGRAM)

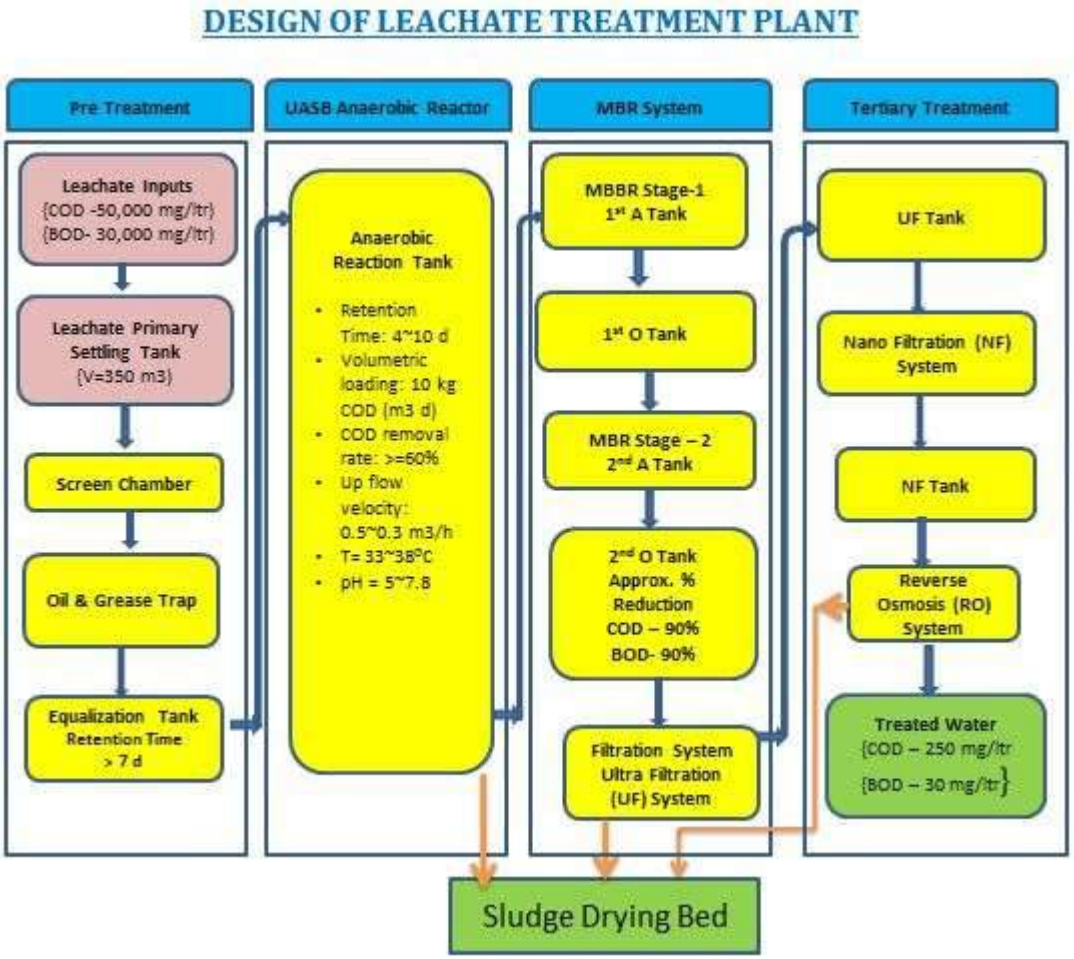


TABLE NO. 2.15 DESIGN PARAMETERS OF LEACHATE TREATMENT PLANT

Estimated Wastewater Characteristics:

S.NO.	TEST PARAMETER	UNITS	VALUE
1	PH		6-9
2	Total Suspended Solids	mg/L	10000
3	Total Dissolved Solids	mg/L	20000
4	BOD (5 days at 20℃)	mg/L	30000
5	COD	mg/L	50000
6	Ammonical nitrogen (as N)	mg/L	1800
7	Total Kjeldahl nitrogen(as N)	mg/L	2000

LTP will be designed such that it operates under entire operating range specified and meet guaranteed treated leachate parameters.

Treated leachate Parameters:

S.NO	Controlling item	Unit	Value	SWM 2016 Inland surface water
1.	pH		6.5~8.5	5.5~9.0
2.	Suspended solids	mg/L	≤10	100
3.	Turbidity	NTU	≤5	-
4.	Chroma	times	≤30	-
5.	BOD_5	mg/L	≤10	30
6.	COD_{Cr}	mg/L	≤60	250
7.	Iron（Fe）	mg/L	≤0.3	-
8.	Manganese（Mn）	mg/L	≤0.1	-
9.	Chloride（Cl）	mg/L	≤250	1000
10.	Silicon dioxide（SiO_2）	mg/L	≤50	-
11.	Total hardness（as$CaCO_3$）	mg/L	≤250	-
12.	Total alkalinity（as$CaCO_3$）	mg/L	≤200	-
13.	Sulfate(SO4)	mg/L	≤250	-
14.	Ammonia nitrogen （as N）	mg/L	≤1.0	50
15.	Total nitrogen（as N）	mg/L	≤15	100
16.	Total phosphorus（as P）	mg/L	≤1.0	-
17.	Total dissolved solids	mg/L	≤1000	2100
18.	Petroleum	mg/L	≤1.0	-
19.	Anionic surfactant	mg/L	≤0.5	-
20.	Residual chlorine	mg/L	0.05	-
21.	fecal coliform	mg/L	1000	-
22.	Arsenic (as As)	mg/L	0.2	0.2
23.	Mercury (as Hg)	mg/L	0.01	0.01
24.	Lead (as Pb)	mg/L	0.1	0.1
25.	Cadmium (as Cd)	mg/L	1.0	2.0
26.	Total Chromium (as Cr)	mg/L	2.0	2.0
27.	Copper (as Cu)	mg/L	3.0	3.0
28.	Zinc (as Zn)	mg/L	5.0	5.0
29.	Nickel (as Ni)	mg/L	3.0	3.0
30.	Cyanide (as CN)	mg/L	0.2	0.2
31.	Fluoride (as F)	mg/L	1.5	2.0
32.	Phenolic compounds (as C_6H_5OH)	mg/L	1.0	1.0

Figure no. 2.13 Mass Balance Diagram of LTP

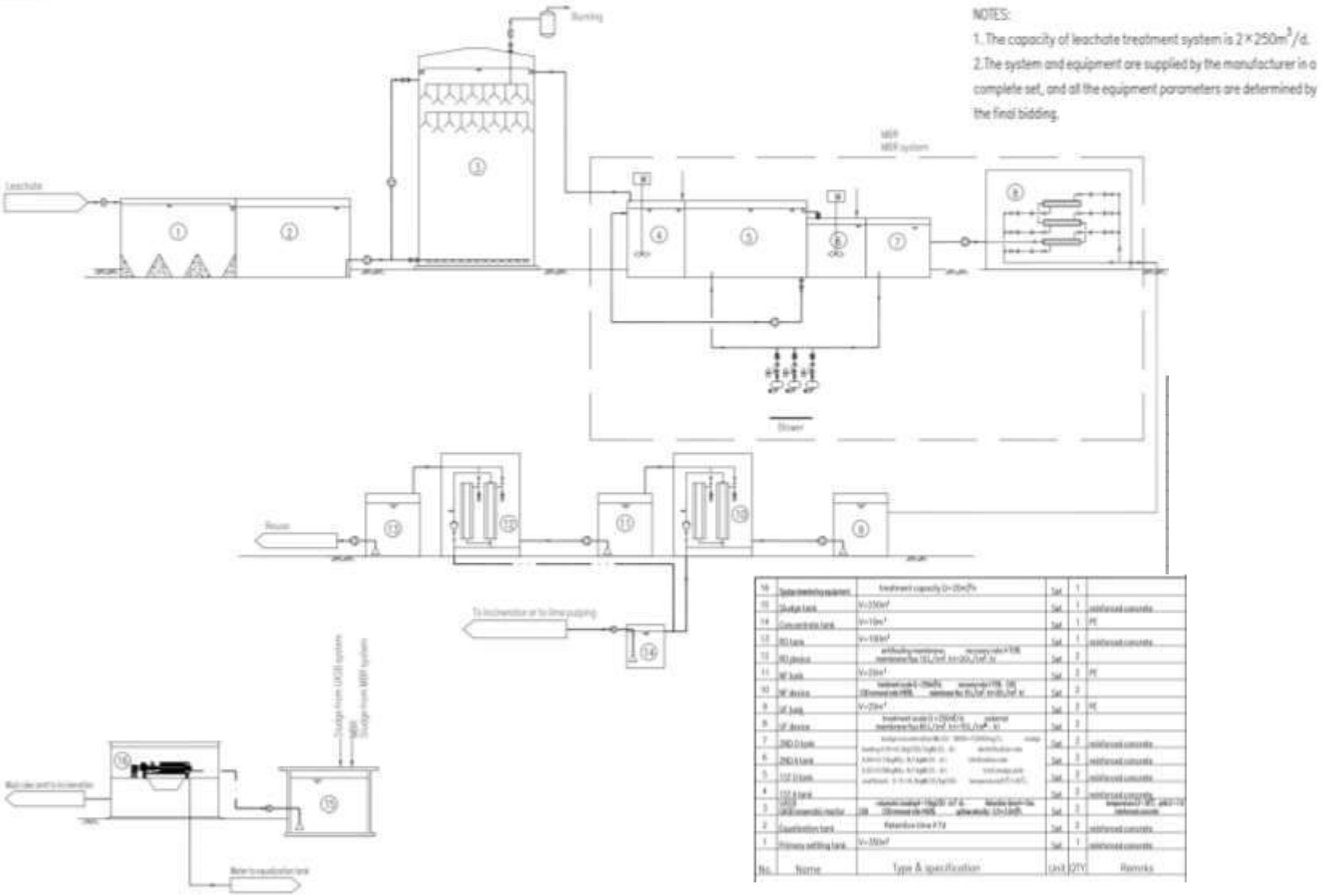


TABLE No. 2.16 EQUIPMENT SPECIFICATIONS FOR LEACHATE TREATMENT PLANT 500 M3/D (2X250 M3/D):

1.0	**Pre Treatment**		
	Primary Settling Tank:		
	Quantity	:	1 No.
	Volume	:	350 m3
	MOC	:	Reinforced Concrete
2.0	**Oil Skimmer/Oil & Grease Trap:**		
	Application	:	For removal oil from effluent at Oil & Grease Trap
	Type	:	Belt, Portable
3.0	**Equalization Tank:**		
	Quantity	:	2 No.
	Application	:	For ensuring continuous and uniform quality feed
	Retention time	:	>= 7 d
	MOC	:	Reinforced Concrete
4.0	**UASB Anaerobic Reactor**		
	Quantity	:	2 Nos.
	Application	:	
	Volumetric Loading	:	10 kg COD (m3 d)
	Retention Time	:	4~10 d
	COD removal rate	:	>60%
	Up-flow velocity	:	0.5~3.0 m3/h
	Temperature	:	33~38^{0}C
	pH	:	5~7.8
	MOC	:	Reinforced Concrete
5.0	**A/O tanks**		
	Quantity	:	2 Nos. each (Total 8 no. of tanks)
	Application	:	
	Sludge Concentration (MLSS)	:	8000~15000 mg/l
	Sludge loading	:	0.05~0.3 kgCOD/(kgMLSS. d)
	Denitrification rate	:	0.04~0.13 kg NO3- N/(kgMLSS. d)
	Nitrification rate	:	0.02~0.06 kg NH4-N/(kgMLSS. d)
	Total Sludge Yield Coefficient	:	0.15~0.3 kg MLSS/kgCOD
	Temperature	:	20^{0}C ~ 35^{0}C
	MOC	:	Reinforced Concrete
6.0	**UF Device**		
	Quantity	:	2 No.
	Treatment Scale	:	Q=250 m3/d
	External Membrane Flux	:	60 L/(m2.h)~ 70L/(m2. h)

7.0	**UF Tank**		
	Quantity	:	2 No.
	Volume	:	20 m3
	MOC	:	PE
8.0	**NF Device**		
	Quantity	:	2 No.
	Treatment Scale	:	Q=250 m3/d
	Recovery rate	:	>=75%
	COD removal rate	:	>=80%
	Membrane Flux	:	10L/(m2.h)~ 20L/(m2. h)
9.0	**NF Tank**		
	Quantity	:	2 No.
	Volume	:	20 m3
	MOC	:	PE
10.0	**RO Device**		
	Quantity	:	2 No.
	Antifouling Membrane	:	-
	Recovery rate	:	>=70%
	Membrane Flux	:	10L/(m2.h)~ 20L/(m2. h)
11.0	**RO Tank**		
	Quantity	:	1 No.
	Volume	:	100 m3
	MOC	:	Reinforced Concrete
12.0	**Concentrate Tank**		
	Quantity	:	1 No.
	Volume	:	10 m3
	MOC	:	PE
13.0	**Sludge Tank**		
	Quantity	:	1 No.
	Volume	:	250 m3

	MOC	:	Reinforced Concrete
14.0	**Sludge Dewatering Equipment**		
	Quantity	:	1 No.
	Treatment Capacity	:	Q=20 m3/h

a) Landfill Gas Generation, Control and Management

The landfill gas is generated due to the degradation of the organic matter in the wastes. Since the landfill material will be basically inert, the landfill gas generation will be minimal. However, a minor portion of un-composted material may also go to the landfill and therefore adequate gas ventilation system has to be provided as a part of the design. Passive vents shall be provided to release the build up pressure in landfill.

b) Storm Water Control and management

The drains of storm water from the active landfill area and processing plant area, adequate drainage facilities are recommended for landfill area. As a part of this, drainage arrangements in each phase of the landfill will have to be constructed and drain towards the existing ravine side of the disposal site. Temporary and permanent drainage ditches would be installed in waste reception area, topsoil storage plant, haul roads, floor preparation areas and waste placement areas.

c) Buffer Zones

A vegetative cover will have to be provided as buffer zone between landfill site and the nearby localities. In addition to the buffer zone a compound wall/rigid fencing all-round the processing facility to a height of 3m or as suitable, shall also to be constructed, to totally seclude the site from outside activities. The proposed vegetative cover (3-Tier) shall comprise trees and shrubs that improve the visual and aesthetic appearance of the site. In addition the waste reception area, administrative area and segregation areas shall also be provided with vegetative cover to the extent possible.

2.8 CONTAINMENT OF POTENTIAL POLLUTANTS

Containment measures such as double liners at the bottom and lateral sides of the landfill, and surface capping after the land filling is completed, are required to control the pollutants and mitigate subsequent impacts on environment.

a) Basal and Lateral Containment

The basal and lateral containment at the site shall be provided by using in situ natural soils and geological strata of permeability less than $1x\ 10^{-9}$ m/sec. detailed geo-technical investigations, by excavating top soil should be carried out to assess the permeability of the soil. The site preparation and construction of liner will comprise of

a. Site clearance

b. Grading and dozing of the floor at foundation level to provide suitable slope for gravity drainage of leachate.

c. Placement and compaction of excavated clay in minimum of four lifts of 250 mm thick with clay placed at or within +4% of optimum moisture content.

d. Within each major phase the mineral liner will be laid, as to be continuous at foundation level and will form as the primary containment layer.

If the geo-technical investigations conclude soil permeability, not suitable for liners, clay either has to be imported or in situ sandy materials, has to be improved though addition of bentonite under controlled application rates.

The bottom and side layers of landfill will be constructed with several layers which includes clay layer, HDPE, Geotextile facilitating leachate collection through network which avoids percolation of leachate in to ground water.

b) Surface Capping

To minimize the ingress of water into the site after completion, it is proposed to form an engineered capping layer. This will comprise a multi-layer system comprising,

a. A protective layer of graded fine granular material of 100 mm thick and free from objects larger than 10 mm size, placed above the gas drainage layer over the last lift of waste.
b. Sealing layer with a maximum permeability and an equivalent layer of clay 1m thick with a permeability of 1×10^{-9} m/sec .
c. A second protective layer with same specifications as mentioned above, placed above the sealing layer.

c) Ground and Surface Water Interception and Drainage

Conventional dewatering measures shall be employed within the landfill area to discharge and maintain groundwater levels below landfill foundation level. This will be ensured through

a. Pumping from perimeter trench drains installed on the bunds or from sumps installed below the landfill foundation level for areas undergoing preparation
b. Installation of temporary or permanent surface water interception drainage ditches to carry peak rainfall runoff and prevent flooding of landfill site.

d) Landfill Gas and Management

The primary measures to restrict the uncontrolled migration of landfill gas from the site will comprise,

a. Low permeability containment layers and systems installed on the base and side walls
b. Permeable gas drainage blanket of 0.3m thickness laid beneath the capping layer and
c. Passive vents will be arranged.

The gas drainage blanket will be formed of a layer of fines free, graded granular fill overlain by a layer of fine sand 100 mm thick and provide protection to the capping layer.

e) Surface Restoration

The landfill will be brought up to its pre-settlement level in stages and capped off in a program of progressive restoration, to limit the ingress of water into the site and to facilitate the control of landfill gas. The capping will be a composite structure comprising of four layers of an engineered seal designed to prevent water ingress and egress of landfill gas and an agricultural cap comprising of subsoil drainage layer.

2.9 Odour Suppression & Control System

The waste processing plants are very susceptible with respect to its bad Odour and cleanliness issues. It is very important to manage these two points in order to make its acceptability in public. The following measures are proposed to manage these issues:

i. The unloading, storage as well as processing of waste will be done in completely covered sheds.

ii. Indigenous Tree & root Aroma Plantation © IECRS (ITRA) Plantation technique - Z shape will be used to deal with the odour problem at the project site.

iii. Enzymes will be sprayed over the unloaded waste in order to decompose & dry the organic matter. The drying of the organic matter also reduces the bad odour from.

iv. The whole shed area will be maintained under negative pressure by sucking the unpleasant air and methane gases by network of ducts

v. The air from waste processing area shall be passed through scrubber where the odour gases are treated with odour neutralizers. A wet scrubber shall be installed at the outlet of suction blower for cleaning the unpleasant gases. Scrubbing the unpleasant gases with water mixed with odour neutralizer will remove the unpleasant odour. After scrubber a chimney of sufficient height will be installed on the scrubber itself to efficiently disperse the treated air.

vi. Spray of odour neutralizers in every section of shed to maintain the odour free ambience. The agent will be sprayed through a network of nozzles connected

via tubes throughput the complete shed. It will be sprayed with the help of misting system having number of nozzles covering entire MSW pit and processing area. High pressure pumps will be used to spray these odour neutralizers.

vii. Frequent cleaning of the areas which will be used for waste movement into the plant like vehicle moving path, weighbridge, unloading areas, etc.

viii. Tipping floors are provided with the bottom slope for removal of leachate after unloading of the waste. Leachate will be removed from the bottom of the pit and collected in leachate collection tank. From leachate collection tank it will be pumped to the leachate treatment plant.

A suitable vegetative cover will have to be established on the closed site to ensure slow surface runoff, promote evaporation of rainfall, retain moisture in the cap and enhance the formation of a soil structure in the agriculture soil.

f) Other Measures

Specific attention shall be paid to mitigate the following undesirable and potentially deleterious effects of-

a) Litter blown from the disposal / tipping area
b) Scavenging animals, vermin and insects attracted to the sites
c) Flies and Bird attraction
d) Dust from landfill operations
e) Mud generated from waste, cover, capping materials and site excavation works
f) Fire and smoke control and
g) Noise of operating plant

These effects can be minimized by providing local litter, arrestor, fencing, strategically placed in relation to the discharge point, erecting site security fencing for excluding scavenging animals, bird scaring techniques for avoiding bird nuisance, etc.

2.10 UTILITIES

2.10.1 Man power requirement

During construction phase around 600 workers will be required including contractual & non contractual manpower (i.e. Officers, skilled workers & semi-skilled workers).

During operation phase 2100 workers (including manpower required for waste collection & transportation) will be required, This manpower nos. consists of contractual & non contractual workers (i.e. Officers, skilled workers, Semi-skilled, EHS officers, Plant Staff etc.). Majority of workers will be hired locally.

2.10.2 Water requirement

Fresh water requirement is 8 -10 KLD during construction phase which will be sourced directly from Municipal Corporation of Gurgaon (MCG) and during operation phase the total supply water for production and drinking use in the whole plant is 33 m3/h (792 KLD) & 0.5 m3/h (12 KLD) respectively.

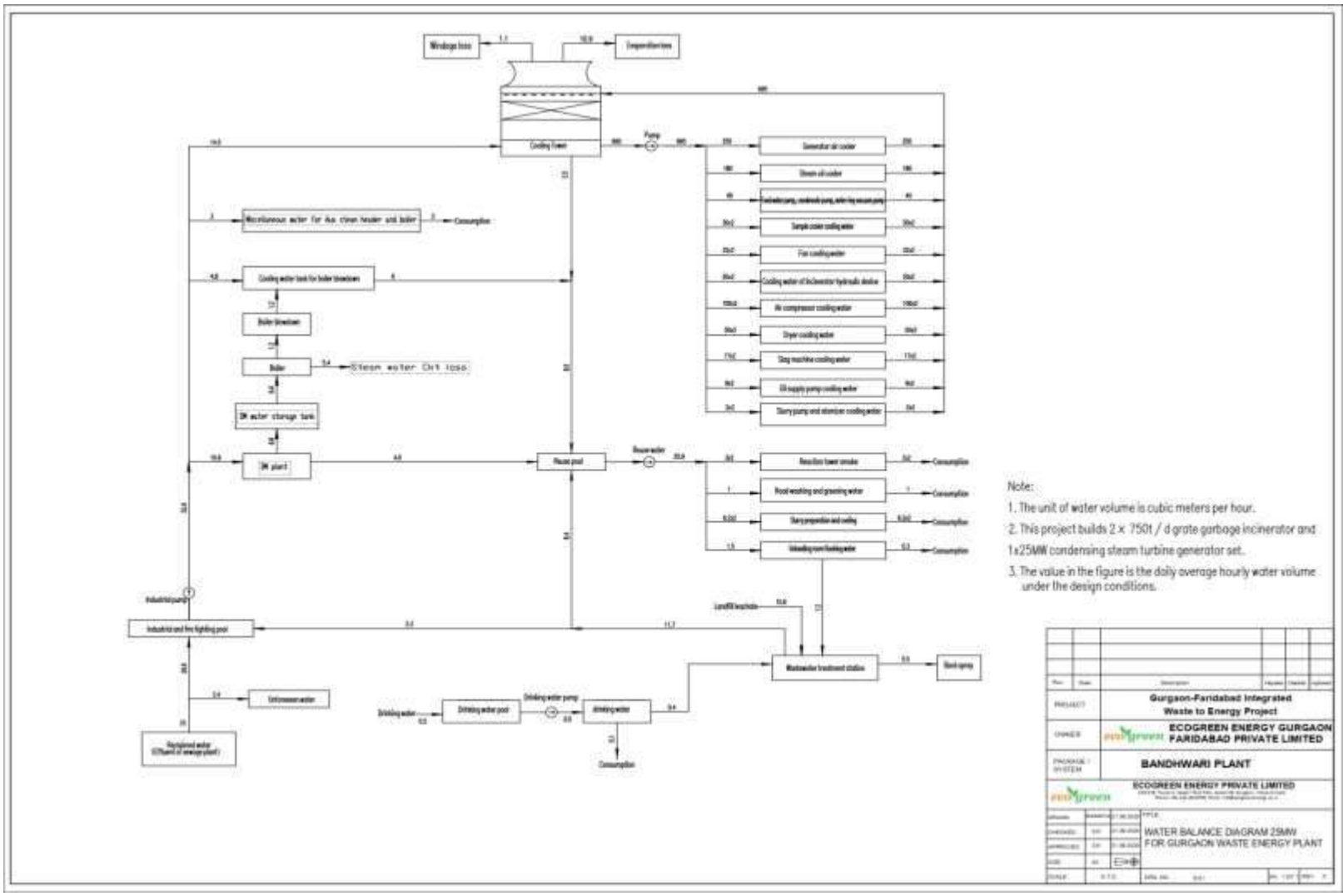
The Production Water demand i.e 792 KLD will be sourced from nearby STP approved by GMDA and required drinking water i.e 12 KLD will be sourced separately through MCG approved water tankers. Water balance diagram for the project is shown in figure no. 2.10.

Approval from GMDA to receive 4 MLD reclaimed water from STP for the project operation was obtained Memo no. GMDA/S&S/2018/579 dt: 24.05.2018, enclosed as annexure -VII.

2.10.3 Power requirement

Power up to 675 KW will be sourced from local grid during construction phase and will be backed up through 630 KVA DG set. During operation phase auxiliary supply from proposed waste to energy plant of 25 MW will cater the need of the MSW processing facility and same shall again be backed through Grid supply & 1500 KVA DG set shall be used as the emergency power supply for the project.

FIGURE- 2.14 WATER BALANCE DIAGRAM



CHAPTER-III

DESCRIPTION OF THE ENVIRONMENT

3.1 INTRODUCTION

Baseline environmental status in and around the proposed project site depicts the existing environmental conditions of Air, Noise, Water, Soil, Biological and Socio-economic environment. The main aim of the baseline study is to identify the critical environmental attributes which will be affected and have adverse impacts on the surrounding systems due to the present scenario. This study is carried out during the project planning stage itself, so that the proposed facilities can be implemented in a technically, financially and environmentally sustainable long term basis. Baseline data was collected for various environmental attributes so as to compute the impacts that are likely to arise due to proposed Expansion of Waste to Energy (WtE) Plant from 15 MW to 25 MW at Integrated Municipal Solid Waste Management (IMSWM) Processing Facility at Bandhwari, Gurgaon District, Haryana.

3.2 LOCATION

Gurgaon district is one of the districts of the state of Haryana with its headquarters at Gurgaon city. Gurgaon city has a population of about 1,000,000 according to the 2001 census. Gurgaon is one of Delhi's four major satellite cities. Gurgaon district is situated in NCR of Delhi. It is just 10 km away from Indira Gandhi International Airport, Delhi. It is the southern-most district of Haryana. The district lies between 27 degree 39' and 28 degree 32' 25" latitude, and 76 degree 39' 30"and 77 degree 20' 45" longitude. On its north, it is bounded by the district of Rohtak and the Union Territory of Delhi. Faridabad district lies to its east. On its south, the district shares boundaries with the states of Uttar Pradesh and Rajasthan. To its west lie the district of Rewari and the State of Rajasthan. Gurgaon town is about 32 km away from New Delhi.

Because of its close proximity to Delhi and excellent infrastructure, Gurgaon has become one of the most important corporate and industrial hubs of India. The corporate office and manufacturing plant of India's largest car maker Maruti Udyog Limited is situated here, as are a large number other industries. The main manufacturing unit of Hero Honda is also situated in Gurgaon. Other areas in which Gurgaon is excelling are the Information

Technology (IT) industry, Software development and Call Centers. List of Important & Major industries in Gurgaon along with their approximate arial distance from project site are mention below:

Table 3.1 List of Important & Major Industries in Gurgaon

Sr. No	Name of Industry	Type of Industry	Distance (in km)
1	NISE Solar-Thermal Power Plant	Solar – Thermal Power Plant	2.5
2	TERI's Solar & Biomass Hybrid Cold Storage	Solar energy equipment supplier	2.8
3	Rana Infra Projects Pvt Ltd	Flyash Bricks making unit	8.8
4	Coromandel Agrico Pvt. Ltd.	Manufacture Of Disinfectants (Agricultural And Other Use)	12.5
5	B.H.P. Engineers Ltd.	Bulk Material Handling And Conveyor Bag Equipment	13.5
6	Arvind Chemi Synthetics Pvt.Ltd	HDEP Bags	20
7	Dhanuka Pesticides Ltd.	Pesticides Technical & Formulation	20.2
8	Kabir Leathers Pvt Ltd	leather and garment leather	21.0
9	Yadav Traders Pvt Ltd	Landscape care and maintenance	21.8
10	Maruti Udyog Limited	Automation/Automobile Manufacturing	25.0
11	Hero Honda (Hero Moto Cop)		18.0

3.3 STUDY AREA

Considering the project as the centre, a radial distance of 10 km is deemed as 'study area' for baseline data collection and environmental monitoring. This Chapter contains the description of baseline studies of the 10 km radius of the surrounding project site.

The study depends mainly upon two factors. First is estimation of impact from existing project on the environment and the second is assessment of the baseline environmental condition. Both are key factors to arrive at the post project scenario. The estimated impact due to the proposed project can be superimposed over the existing conditions to arrive at the post project scenario. The scope of the baseline studies includes detailed characterization of the following environmental components, which are most likely to be influenced by setting up the proposed facility:

- Meteorological Conditions

- Ambient Air Quality
- Noise Levels
- Water Quality (Surface & Ground Water)
- Soil Quality
- Biological Environment
- Land Environment
- Socio Economic Studies

3.3.1 STUDY PERIOD

The baseline data generation for the IMSWM- WTE project has been carried out during the winter season of (Oct 2020 to Dec 2020). The data is collected with respect to meteorological conditions, air pollution levels, noise levels, water quality, soil quality, land use and socio economic conditions were carried out during the study period. Map showing monitoring location (Air, Water Soil & Noise) is shown in Figure 3.2 in EIA/EMP report.

3.3.2 ENVIRONMENTAL COMPONENTS

In order to assess the impacts of project activities on existing physical, biological and social environment, it is necessary to study the present scenario of the area by collecting the information on following parameters :-

- ❖ Micrometeorological
- ❖ Land Environment
- ❖ Water Environment
- ❖ Air Environment
- ❖ Noise Environment
- ❖ Ecology & Biodiversity (Biological) Environment
- ❖ Socio- Economic Environment

3.3.3 METHODOLOGY

The generation of primary baseline data and information on micrometeorological data, ambient air quality, water quality, noise level, soil quality and flora & fauna descriptions

are from the site and surroundings was carried out and was analysed by NABL accredited & MoEF&CC recognized laboratory M/s Wolkem India Limited, Udaipur.

Micrometeorological data at the site for study period (Oct 2020 to Dec 2020) was collected. Apart from these, secondary data have been collected from IMD, Climatological data, CPCB real time air quality monitoring data, Census Handbook, Revenue Records, Statistical Department, Soil Survey and Land use Organization, District Industrial Centre, Forest Department of Haryana State, Central Ground Water Authority and State/District Ground Water Department etc.

3.4 ESTABLISHMENT OF BASELINE FOR VALUED ENVIRONMENT COMPONENT

3.4.1 MICROMETEOROLOGICAL DATA

The study of micrometeorological conditions of a particular region is of utmost importance to understand the variations in ambient air quality status in that region. The prevailing micrometeorology at project site plays a crucial role in transport and dispersion of air pollutants released from the project site. The persistence of the predominant wind direction and wind speed at the project site will decide the direction and extent of air pollution impact zone. The principal variables which affect the micrometeorology are horizontal transport and dispersion (average wind speed and directions), convective transport and vertical mixing (atmospheric stability) and topography of the area towards local influences.

The micrometeorological data recorded in the study region as well as surface meteorological data procured from IMD corresponding to nearest available observatories are appropriately used in this study. The hourly record of wind speed and wind direction during the study period was used for computing the relative percentage frequencies of wind occurrences in various directions. The observed meteorological data at site is given in Table-3.2. Secondary meteorological data has been mentioned in Table 3.3 is procured from the nearest IMD station of Gurgaon. The wind rose diagram for winter season is presented in Figure 3.1.

Table 3.2 Observed Meteorological Data

Period	Temp (°C)		Humidity (%)		Rain fall	Predominant wind
	Min	Max	Min	Max	(mm)	

						direction
October 2020	23	42	7	48	0	NW to SE
November 2020	18	35	6	70	33	
December 2020	11	32	13	68	11	

During the winter season, the winds were predominantly recorded from NW closely followed by W. Calm condition prevailed for 0.27% of the total time and the average wind speed for the season was observed to be 3.40 m/s.

Table 3.3 Meteorological Data from IMD (1981-2010)

IMD Station–Gurgaon							
Month	Temperature		Relative Humidity		Rainfall	Wind Direction	
	Min	Max	Min	Max	Total	1st Predominant	2nd Predominant
January	2.4	24.9	54	82	15	NW	W
February	4.2	28.7	45	73	21.4	NW	SE
March	8	35.7	37	65	12.3	NW	SE
April	13.3	42.1	28	49	18.2	NW	W
May	18.3	44.5	31	48	34.3	NW	SE
June	21.6	44.9	40	57	67.3	NW	SE
July	23.1	40.2	63	76	171.4	SE	NW
August	23.2	37.8	69	81	190.7	SE	NW
September	20.5	37.6	59	74	93.8	NW	SE
October	12.4	36.2	45	66	12	NW	SE
November	7.2	32.7	47	68	10.7	NW	W
December	2.8	27	55	80	9.9	NW	W
	2.4	44.7	48	68	657 mm	NW	SE

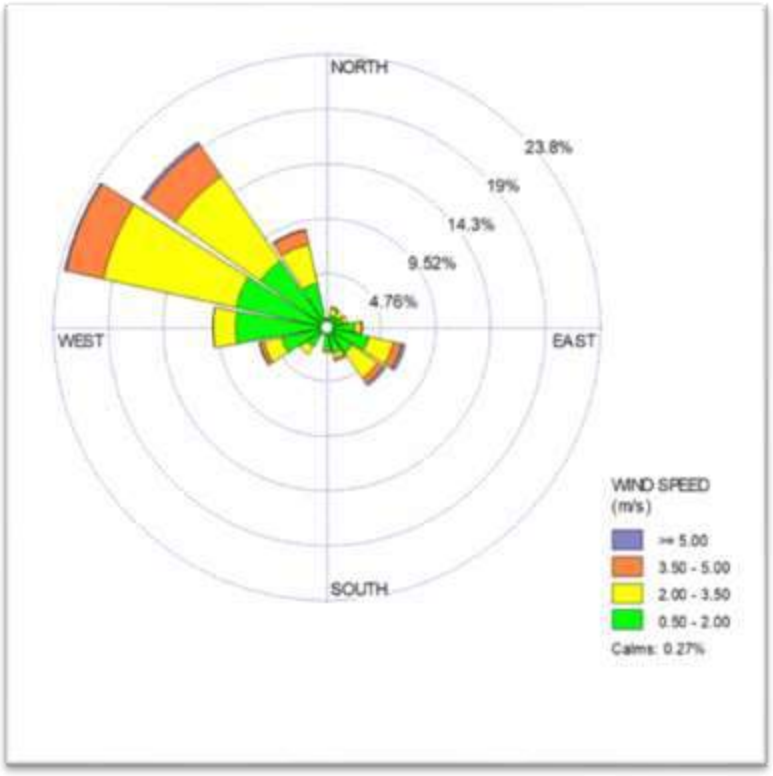
Source: GOI, Ministry of Earth Sciences, IMD, Climatological Tables - 1981-2010

Table 3.4 Season (Dec 2016 to Feb 2017) Frequency Distribution Table

Direction/ Wind Classes (m/s)	0.5-2.0	2.0-3.5	3.5-5.0	>5.0	Total (%)
N	0.40	0.36	0.13	0.00	0.90
NNE	1.08	0.67	0.00	0.13	1.90
NE	1.26	0.49	0.00	0.00	1.76
ENE	1.53	0.36	0.00	0.00	1.90
E	2.49	0.54	1.35	0.00	3.17
ESE	3.80	2.17	0.72	0.31	7.01
SE	2.76	2.67	0.58	0.22	6.25
SSE	2.35	0.45	0.27	0.00	3.07

Direction/ Wind Classes (m/s)	0.5-2.0	2.0-3.5	3.5-5.0	>5.0	Total (%)
S	1.81	0.27	0.13	0.00	2.21
SSW	0.54	0.00	0.13	0.00	0.67
SW	2.17	0.76	0.00	0.00	2.94
WSW	4.07	1.58	0.36	0.09	6.11
W	7.97	1.94	0.00	0.04	9.96
WNW	8.15	11.73	3.30	0.13	23.32
NW	7.11	8.92	3.30	0.31	19.65
NNW	3.98	3.44	1.26	0.09	8.78
Calms (<0.5m/s)					**0.27**
Total					**100%**
Note: 1. All Values are in Percentage					

Figure 3.1 Wind Rose Diagram- Winter Season (Oct 2020-Dec2020)



3.4.2 Ambient Air Quality Monitoring

The ambient air quality in the study area was monitored as per MoEF&CC guidelines. The prime objective of the baseline air quality study is to assess the existing ambient air quality of the area with reference

The baseline status of the ambient air quality has been assessed through a scientifically designed ambient air quality network. The design of monitoring network in the air quality surveillance programme has been made based on the following considerations to conventional air pollutants.

Methodology adopted for the study

- Topography of the study area.
- Representation of regional background.
- Populated and sensitive areas.
- Screening of maximum ground level concentrations and distances of their likely occurrences as per climatologically normal.
- Representation of valid cross sectional distribution in downwind direction

Ambient Air Quality Monitoring (AAQM) stations were installed at 8 different locations with due consideration to the above mentioned points. AAQ locations were selected in downwind, cross wind and upwind direction of the proposed project location. The details of air quality monitoring stations are given in Table 3.5. The map showing ambient air quality sampling locations is given in Figure 3.2.

The common air pollutants namely Particulate matter (PM10& PM2.5), Sulphur dioxide (SO2), the oxides of nitrogen (NOX), Carbon Monoxide (CO), Ammonia (NH3), Benzene (C6H6), Methane (CH4) Lead (Pb), Nickel (Ni), Ozone (O3), Arsenic (As), Hydrogen Sulfide (H2S), VOCs, Mercury (Hg) and Benzo (a) Pyrene (BaP) were sampled on 8/24 hourly and results were averaged to 24 hours to meet the requirements of the MoEF&CC and compared with the standards stipulated by CPCB. The detailed ambient air quality levels are given in Table 3.6 – 3.9.

Table 3.5 Ambient Air Quality Monitoring Locations

Code	Name of the	W.R.T Site	Latitude	Longitude

	Location	Direction	Wind	Distance km	(N)	(E)
A1	Project Site	-	Core	-	28°24'13.25"	77°10'24.15"
A2	Bandhwari	W	CW	2.3	28°24'35.16"	77°09'20.44"
A3	Mandi	NW	UW	4.8	28°26'23.29"	77°08'27.04"
A4	Dhakuwala Johar	NE	CW	5.7	28°25’35.04”	77°13’28.08”
A5	Gothda Mohtabad	SE	DW	3.5	28°22’40.05”	77°13’05.28”
A6	Pakhal	SE	DW	6.3	28°21’47.42”	77°13’14.27”
A7	Palika Bas	ESE	CW	6.9	28°22’52.58”	77°14’08.58”
A8	Gosainwala Johar	SW	CW	5.1	28°21'00.84"	77°08'08.20"

Figure 3.2 Ambient Air Quality Sampling Location Map

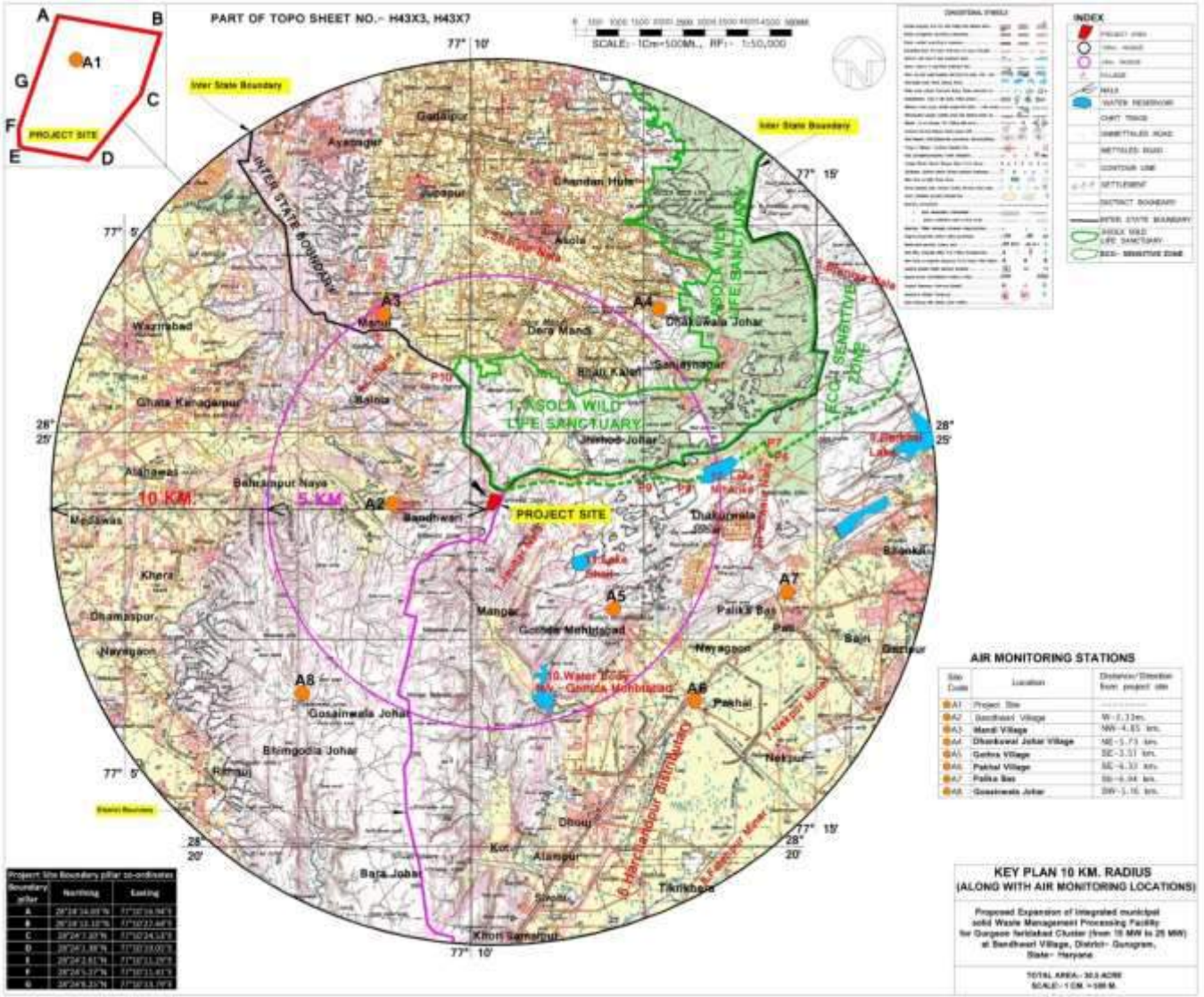


Table 3.6 Ambient Air Quality Levels PM_{10}, $PM_{2.5}$, SO_2 (µg/m³)

Code	Name of the Location	PM_{10}			$PM_{2.5}$			SO_2		
		Min	Max	98th %	Min	Max	98th %	Min	Max	98%
A1	Project Site	226.21	355.03	354.37	98.98	144.20	140.23	13.67	20.07	19.99
A2	Bandhwari	264.01	304.10	303.74	113.60	130.49	130.31	11.24	16.89	16.74
A3	Mandi	292.41	317.80	317.33	122.05	136.85	135.81	10.89	19.78	19.48
A4	Dhakuwala Johar	105.07	160.40	154.42	63.42	98.22	98.04	9.37	16.92	16.65
A5	Gothda Mohtabad	229.96	266.15	265.49	95.51	118.15	117.54	8.44	19.12	18.00
A6	Pakhal	230.79	271.01	269.30	68.54	122.26	120.07	8.25	12.74	12.69
A7	Palika Bas	207.23	245.52	245.00	80.28	106.88	105.31	8.72	12.86	12.84
A8	Gosainwala Johar	236.93	278.30	273.15	92.67	118.46	118.43	9.85	15.58	14.38
98th Percentile Range		**154.42 to 354.37**			**98.04 to 144.23**			**12.69 to 19.99**		
NAAQ Standards 2009		**100 (24 hourly)**			**60 (24 hourly)**			**80 (24 hourly)**		

Table 3.7 Ambient Air Quality Levels NOx, NH_3, O_3 (µg/m³)

Code	Name of the Location	NOx			NH_3			O_3		
		Min	Max	98th %	Min	Max	98th %	Min	Max	98%
A1	Project Site	60.41	74.19	74.09	36.09	62.02	62.02	16.47	44.54	44.47
A2	Bandhwari	7.25	55.34	54.55	36.65	65.40	63.71	20.34	32.80	32.15
A3	Mandi	28.54	58.69	58.05	41.16	58.64	58.07	14.18	31.08	30.65
A4	Dhakuwala Johar	24.54	39.42	38.70	41.72	70.48	69.92	14.32	46.83	46.62
A5	Gothda Mohtabad	26.80	46.02	45.14	40.03	62.02	60.61	16.76	52.85	49.13
A6	Pakhal	21.02	35.48	34.95	23.34	36.65	36.37	9.17	20.77	19.62
A7	Palika Bas	16.34	27.50	27.29	10.66	26.50	24.81	3.15	8.88	8.81
A8	Gosainwala Johar	25.43	42.13	41.42	16.92	68.22	65.40	17.33	33.80	33.37
98th Percentile Range		**27.29 to 74.09**			**24.81 to 69.92**			**8.81 to 49.13**		
NAAQ Standards 2009		**100 (24 hourly)**			**60 (24 hourly)**			**80 (24 hourly)**		

Table 3.8 Ambient Air Quality Levels of Volatile Organic Pollutants

Code	Name of the Location	CO mg/m³			C_6H_6 µg/m³			CH_4 mg/m³		
		Min	Max	98th %	Min	Max	98th %	Min	Max	98th %
A1	Project Site	1.05	2.10	2.06	1.11	1.74	1.70	0.48	0.82	0.82
A2	Bandhwari	0.98	2.11	2.00	1.21	1.70	1.66	0.51	0.71	0.71
A3	Mandi	0.87	2.17	1.89	0.51	0.92	0.92	0.42	0.62	0.61
A4	Dhakuwala Johar	0.50	1.10	1.09	0.58	1.15	1.14	0.31	0.61	0.61
A5	Gothda Mohtabad	0.57	1.14	1.13	0.10	1.21	1.09	0.33	0.62	0.61
A6	Pakhal	0.47	1.13	1.12	0.52	0.84	0.84	0.31	0.59	0.58
A7	Palika Bas	0.47	1.14	1.11	0.42	0.90	0.87	0.30	0.60	0.59
A8	Gosainwala Johar	0.52	1.16	1.14	0.52	1.16	0.15	0.32	0.61	0.61
98thPercentile Range		**1.09 to 2.06**			**0.15 to 1.70**			**0.58 to 0.82**		
NAAQ Standards 2009		**4.0**			**5.0**			**-**		

Table 3.9 Ambient Air Quality Levels (Lead, Nickel, Arsenic, Hydrogen Sulfide, Benzo (a) Pyrene, Mercury, VOCs & NMHC

Parameter	Lead - µg/m³	Nickel ng/m³	Arsenic - ng/m³	B(a)P ng/m³	H_2S PPM	Hg ng/m³	VOCs µg/m³	NMHC ng/m³
98th Percentile Range	*BDL (<0.05)	BDL (<5)	BDL (<1.0)	BDL (<0.2)	BDL (0.05)	BDL	BDL	BDL
NAAQ Standards & CPCB Norms	**1.0**	**20**	**6**	**1.0**	**0.36**	**-**	**-**	**-**

***BDL – Below Detectable**

3.4.2.1 Air Quality Scenario in the Study Area

a. Particulate Matter <2.5µm & <10 µm

The 98thpercentile of Particulate Matter <2.5µm recorded with in the study area were in the range of 98.04 to 144.23 µg/m3. The 98th Percentile of Particulate Matter<10µm recorded with in the study area were in the range of 154.42 to 354.37 µg/m3. The 24 hourly average values of Particulate Matter <2.5µm & Particulate Matter <10µm were compared with national ambient air quality standards and found that all sampling locations recorded values are above the applicable limits of residential and rural area limits for all locations in the study area. This may be because of continuous practice of stubbles burning in nearby villages in Haryana as well as Delhi regions.

b. Sulfur Dioxide

The 98th Percentile of SO2 recorded within the study area was in the range of 12.69 to 19.99 µg/m3. The 98th percentile values of SO2 were compared with the national ambient air quality standards and it was found that all sampling locations recorded values much lower than the applicable limit to 80 µg/m3 for industrial, residential and rural areas.

c. Oxides of Nitrogen

The 98th Percentile of NOx recorded within the study area was in the range of 27.29 to 74.09 µg/m3.The 24 hourly average values of NOx were compared with national ambient air quality standards and it was found that all the sampling locations recorded values lower than the applicable limit of 80µg/m3 for industrial, residential and rural areas.

d. Carbon Monoxide

The 98th Percentile of CO recorded within the study area was in the range of 1.09 to 2.06 mg/m3. The 24 hourly average values of CO were compared with national ambient air quality standards and it was found that all the sampling locations recorded values lower than the applicable limit of 4000µg/m3 (4 mg/m3) for industrial, residential and rural areas.

e. Ozone

The 98th percentile of ozone recorded within the study area was in the range of 8.81 to 49.13 µg/m3. The 8 hour average values of ozone were compared with the national ambient air quality standards and found that the recorded values were within the applicable limits of residential and rural area for all the locations in study area.

f. Ammonia

The 98th percentile of NH3 recorded within the study area was in the range of 24.81 to 69.92 µg/m3.

Interpretation:

It is observed that the monitored parameters are within the permissible limits as per NAAQS, 2009 during the study period except PM_{10} & $PM_{2.5}$ which were very high due to the continuous practice of stubbles burning in nearby villages in Haryana as well as Delhi.

3.4.3 Water Quality Assessment

Surface water and ground water samples were collected from different sources within the study area and analysed for some important physical and chemical parameters including heavy metals for depicting the baseline status of the study area.

During the study period, a total of 8 ground water samples and 3 surface water samples were collected from the study area in order to assess the water quality. Ground water samples were drawn from hand pumps and bore wells used by the villagers for their domestic needs. Surface water samples were collected from river/nallas/lake in the study area. Details of the sampling locations are given in Table 3.10 and Figure 3.3.

Water samples collected from the locations below were analysed for important water quality parameters and the analytical results were compared with IS: 10500-2012 drinking water standards. The results are shown in Table 3.11. Surface water results were compared with IS: 2296-1992 and shown in Table 3.12.

Table 3.10 Water Sampling Locations

Code	Name of the Location	W.R.T. Site		Latitude (North)	Longitude (East)
		Distance (km)	Direction		
Ground Water					
GW1	Project Site	-	-	28°24'13.25"	77°10'24.15"
GW2	Bandhwari	2.3	W	28°24'35.16"	77°09'20.44"
GW3	Mandi	4.8	NW	28°26'23.29"	77°08'27.04"
GW4	Dhakuwala Johar	5.7	NE	28°25’35.04”	77°13’28.08”
GW5	Gothda Mohtabad	3.5	SE	28°22’40.05”	77°13’05.28”
GW6	Pakhal	6.3	SE	28°21’47.42”	77°13’14.27”
GW7	Palika Bas	6.9	ESE	28°22’52.58”	77°14’08.58”
GW8	Gosainwala Johar	5.1	SW	28°21'00.84"	77°08'08.20"
Surface Water					
SW1	Pond (Bandhwari Village)	1.3	SW	28°23'44.80"	77°09'42.72"
SW2	Niharika Lake	4.6	E	28°24’36.30”	77°13’25.90”
SW3	Shail Lake	2.2	SE	28°23’31.68”	77°11’34.73”

Figure 3.3 Ground Water & Surface Water Quality Sampling Locations Map

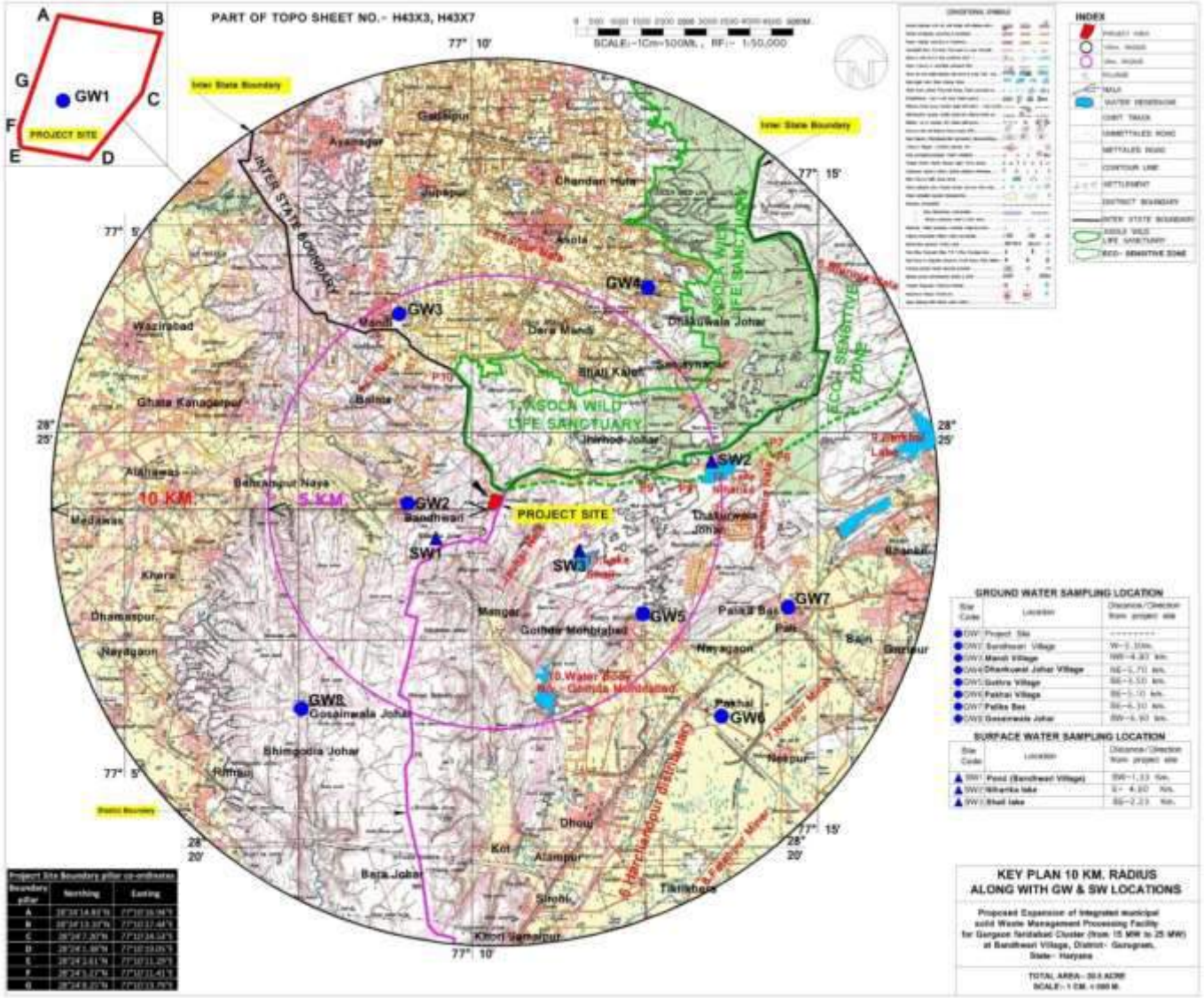


Table 3.11 Water Sampling Analysis Results- Groundwater

S. No	Parameter	Unit	GW1	GW2	GW3	GW4	GW5	GW6	GW7	GW8	IS:10500-2012 Standards	
											Acceptable	Permissible
1	Odor		Agreeable								Agreeable	
2	pH	-	6.76	6.85	6.8	6.92	7.15	6.58	7.22	7.27	6.5-8.5	No relaxation.
3	Turbidity	NTU	0.8	0.3	0.5	0.3	0.4	0.5	0.7	0.4	1	5
4	Elec. Cond	µs/cm	4189	690.2	1301	805.2	983.6	1121	4081	689.4	-	-
5	Total Dissolved solids	mg/l	2988	464	982	590	652	726	2794	726	500	2000
6	Alkalinity as CaCO3	mg/l	408	192	288	218	242	256	388	178	200	600
7	Chlorides as Cl	mg/l	1085	52	184	110	126	146	1015	48	250	1000
8	Sulphates as SO4	mg/l	284.6	28.6	106.4	72.8	53.2	68.6	268.4	41.4	200	400
9	Nitrate as NO3	mg/l	5.1	2.6	3.2	2.9	4.2	3.4	3.4	4.4	45	No relaxation.
10	Total Hardness as CaCO3	mg/l	880	290	320	288	380	308	1120	276	200	600
11	Calcium as Ca	mg/l	220	96	94.4	83.2	75.2	67.2	252	54.4	75	200
12	Magnesium as Mg	mg/l	79.2	12	20.2	19.2	46.1	33.6	117.6	33.6	30	100
13	Sodium as Na	mg/l	168.1	38.2	71.2	42.2	47.4	57.8	146.5	38.6	-	-
14	Potassium as K	mg/l	8.8	3.7	4.1	3.3	3.8	3.5	7.5	2.9	-	-
15	Phosphate as P	mg/l	0.92	0.21	0.26	0.31	0.26	0.33	0.18	0.23		
16	Flouride as F	mg/l	0.7	0.3	0.5	0.3	0.4	0.4	0.6	0.3	1	1.5
17	Iron as Fe	mg/l	0.28	(<0.1)	0.16	(<0.1)	0.13	0.18	0.32	0.11	0.3	No relaxation.
18	Lead as Pb	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	
19	Mercury as Hg	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.001	
21	Cadmium as Cd	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.003	
22	Chromium as Cr	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	
23	Copper as Cu	mg/l	0.04	(<0.01)	(<0.01)	(<0.01)	(<0.01)	(<0.01)	0.08	(<0.01)	0.05	1.5
24	Cyanide as CN-	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	No relaxation.
25	Arsenic as As	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.01	0.05

26	Boron as B	mg/l	0.22	(<0.1)	0.13	(<0.1)	(<0.1)	(<0.1)	0.19	(<0.1)	0.5	1
27	Zinc as Zn	mg/l	0.41	(<0.1)	0.15	(<0.1)	0.11	0.18	0.54	(<0.1)	5	15
28	Total Coliform	MPN/100 ml	1600	300	900	350	500	500	1600	300	Shall not be Detectable/100ml	
29	E.coli	MPN/100 ml	170	60	110	90	70	90	220	50	Shall not be Detectable/100ml	

Table 3.12 Surface Water Sample Analysis Results

Parameter	Unit	SW1	SW2	SW3	IS 2296 – 1992 Inland surface water Stds				
					A	B	C	D	E
Color	Pt-Co	15	<5	<5	10	300	300	-	-
pH	-	6.85	7.31	7.79	6.5 – 8.5				
Odor	Un Objectionable				-		-	-	-
Turbidity	NTU	2.1	1.8	1.4	-	-	-	-	-
Elec. Cond	µs/cm	388.4	457.2	550.2	-	-	-	-	2250
Total Dissolved solids	mg/l	274	290	326	500	-	1500	-	2100
Alkalinity as CaCO3	mg/l	78	72	84	-	-	-	-	-
Chlorides as Cl	mg/l	26	48	64	250	-	600	-	600
Sulphates as SO4	mg/l	20.2	19.8	24.4	400	-	400	-	1000
Nitrate as NO3	mg/l	2.6	2.8	2.9	20	-	50	-	-
Total Hardness as CaCO3	mg/l	116	166	180	200	-	-	-	-
Calcium as Ca	mg/l	25.6	32.8	40	-	-	-	-	-
Magnesium as Mg	mg/l	12.5	20.2	19.2	-	-	-	-	-
Sodium as Na	mg/l	24.7	19.6	22.1	-	-	-	-	-
Potassium as K	mg/l	2.4	2.1	2.2	-	-	-	-	-
Flouride as F	mg/l	0.3	0.2	0.4	1.5	1.5	1.5	-	-
Iron as Fe	mg/l	(<0.1) BDL	(<0.1) BDL	(<0.1) BDL	0.3	-	0.5	-	-
Lead as Pb	mg/l	(<0.01) BDL	(<0.01) BDL	(<0.01) BDL	0.1	-	0.1	-	-

Parameter	Unit	SW1	SW2	SW3	IS 2296 – 1992 Inland surface water Stds				
					A	B	C	D	E
Copper as Cu	mg/l	(<0.1) BDL	(<0.1) BDL	(<0.1) BDL	1.5	-	1.5	-	-
Zinc as Zn	mg/l	(<0.1) BDL	(<0.1) BDL	(<0.1) BDL	15	-	15	-	-
Cadmium as Cd	mg/l	(<0.01) BDL	(<0.01) BDL	(<0.01) BDL	0.01	-	0.01	-	-
Arsenic s As	mg/l	(<0.01) BDL	(<0.01) BDL	(<0.01) BDL	0.05	0.2	0.2	-	-
Mercury as Hg	mg/l	(<0.001) BDL	(<0.001) BDL	(<0.001) BDL	0.001	-	-	-	-
Cyanide as CN	mg/l	(<0.01) BDL	(<0.01) BDL	(<0.01) BDL	0.05	0.05	0.05	0.05	0.05
Boron as B	mg/l	(<0.1) BDL	(<0.1) BDL	(<0.1) BDL	-	-	-	-	2
DO	mg/l	6.2	6.4	6.3	6	5	4	4	
COD	mg/l	8.1	8.1	10.7	-	-	-	-	-
BOD	mg/l	1.4	1.6	1.8	2	3	3	-	-
Total Coliform	MPN/100 ml	60	50	90	Shall not be Detectable/100ml (Limits As Per IS 10500:2012)				
E.coli	MPN/100 ml	<2	<2	<2					

Class A Drinking water source without Conventional Treatment,
Class B Outdoor Bathing,
Class C Drinking Water Source with Conventional Treatment Followed by Disinfection,
Class D Fish Culture and Wild Life Population,
Class E Irrigation, Industrial Cooling

3.4.3.1 Observation & Interpretation on Ground water quality of Study area

- The pH limit fixed for drinking water samples as per IS 10500-2012 is 6.5 to 8.5 beyond this range the water will affect the mucus membrane and or water supply system. During study period the pH in the ground water samples was varying from 6.58 to 7.27. The pH of all samples was falling within the acceptable limit.
- The acceptable limit for total dissolved solids as per IS 10500:2012 is 500 mg/l, whereas the permissible limit in absence of alternate source is 2000 mg/l, beyond this palatability decreases and may cause gastro intestinal irritation. In water samples collected from the study area, the total dissolved solids in groundwater are varying from 464 to 2988 mg/l. One sample is falling within acceptable limit and two samples are falling above permissible limit.
- The acceptable limit for chloride is 250 mg/l as per IS10500:2012 whereas the permissible limit of the same is 1000 mg/l beyond this limit taste, corrosion and palatability are affected. The Chloride levels in the ground water samples collected in the study area were ranging from 48 to 1085 mg/l. Two samples are falling above permissible limit. Rest all samples are within acceptable limit.
- The acceptable limit as per IS10500:2012 for hardness is 200mg/l whereas the permissible limit for the same is 600mg/l beyond this limit encrustation in water supply structure and adverse effects on domestic use will be observed. In the water samples collected from the study area, the hardness is varying from 276 to 1120 mg/l. All samples are falling above the acceptable limit and two samples are falling above the permissible limits.
- The acceptable limit as per IS10500:2012 for fluoride is 1.0 mg/l whereas the permissible limit for the same is 1.5 mg/l. Fluoride content was varying from 0.3 mg/L – 0.7 mg/L which is in acceptable & permissible limit.

3.4.3.2 Observation & interpretation on Surface Water quality

- The pH was varying between 6.85 to 7.79. The pH values for all the samples collected in the study area during study period were meeting the Class ‘A’ norms as per IS: 2296-1992.

- The total dissolved solids were in the range of 274mg/l to 326 mg/l. The TDS for all the samples collected in the study area during study period were meeting the Class 'A' norms as per IS: 2296-1992.
- The chlorides were in the range of 26 mg/l to 64 mg/l, indicating that all samples were meeting the Class 'A' norms as per IS: 2296-1992.
- The hardness is varying between 116 mg/l to 180 mg/l. indicating all samples are meeting the Class 'A' norms as per IS: 2296-1992.

Interpretations:

As per the above observations all the 3 surface water samples were analysed and are meeting the Class 'A' norms as per IS: 2296-1992.

3.4.4 Noise Environment

Noise can be defined as any undesirable sound that interferes with speech and hearing and is intense enough to damage hearing or is otherwise annoying. Noise can also disturb natural wildlife and ecological systems. Noise impacts can be a major concern during the construction and the operational phases of the project. Noise should also be considered in relation to present and future land use zoning and policies.

Construction noise can be a significant source of community noise. The impacts are felt on the people near the construction site, who are totally unrelated to construction activities (e.g. area residents, office workers, school children, staff, etc.). Factors which are important in determining noise levels that will potentially impact such populations include- distance from the noise source, natural or man-made barriers between the source and the impacted population, weather conditions which could potentially absorb, reflect or focus sound (such as wind speed, direction, temperature inversions), the scale and intensity of the particular construction phase (excavation, erection, or finishing). The Environment/ health impacts of noise can vary from Noise Induced Hearing Loss (NIHL) to annoyance depending on loudness of noise levels and tolerance levels of individuals.

Methodology

To understand the noise environment in the study area, a noise survey was conducted using Sound Level Meter 2031 manufactured by Cygnet Systems. Noise measurements were carried out at the same location where ambient air quality was monitored. The 24-hourly sound levels were measured at each location once during the study period.

Equivalent Sound Pressure Level (Leq)

The Leq is the equivalent continuous sound level, which is equivalent to the same sound energy as the actual fluctuating sound measured in the same period. This is necessary because sound from noise source often fluctuates widely during a given period of time. This is calculated from the following equation:

$L_{eq(hrly)} = L_{50} + (L_{10} - L_{90})_2/60$

Also:

- L_{day} is defined as the equivalent noise level measured over a period of time during day (6 AM to 10 PM).
- L_{night} is defined as the equivalent noise level measured over a period of time during night (10 PM to 6 AM).

While measuring the day-night equivalent noise levels (Leq), it is considered that one event at night is equivalent to ten similar events during the day time. Leq is similar to 24 hours equivalent sound level (Leq) except that, during the daytime 10 dB (A) weighing is added. The Leq for a given location in a community may be calculated from the hourly (Leq) equivalent sound levels with a 10 dB (A) correction added to the night time value (Leq).

Day and night-time Leq have been calculated from hourly Leq values and compared with the stipulated standards i.e The Noise Pollution (Regulation And Control) Rules, 2000:

Area Code	Category of Area	Leq. Limits in dB (A)	
		Day Time	Night Time
A	Industrial Area	75	70
B	Commercial Area	65	55

C	Residential Area	55	45
D	Silent Zone	50	40

Note: 1. Day-time is reckoned in between 6:00 a.m and 10:00 p.m.
2. Night time is reckoned is between 10:00 p.m and 6.00 a.m.
3. Silence Zone is defined as areas upto 100 m around such premises as hospitals, educational, institutions and Courts. The Silence Zones are to be declared by the competent authority.

Noise Levels in the Study Area

Noise levels were monitored at 8 locations within the study zone, using a noise measurement device. Random noise level measurements at various locations were carried out for assessment of existing noise levels. Keeping in view the land use pattern, residential areas, schools, bus stands, etc., the day levels of noise have been monitored during 6 AM to 10 PM and the night levels during 10 PM to 6 AM. The noise monitoring stations are shown in Table 3.13 and Figure 3.4. The results are presented in Table 3.14.

Table 3.13 Noise Monitoring Locations

Code	Name of the Location	Area Category	W.R.T. Site		Latitude (N)	Longitude (E)
			Distance km	Direction		
N1	Project Site	Industrial	-	-	28°24'13.25"	77°10'24.15"
N2	Bandhwari	Residential	2.3	W	28°24'35.16"	77°09'20.44"
N3	Mandi	Residential	4.8	NW	28°26'23.29"	77°08'27.04"
N4	Dhakuwala Johar	Residential	5.7	NE	28°25’35.04”	77°13’28.08”
N5	Gothda Mohtabad	Residential	3.5	SE	28°22’40.05”	77°13’05.28”
N6	Pakhal	Residential	6.3	SE	28°21’47.42”	77°13’14.27”
N7	Palika Bas	Residential	6.9	ESE	28°22’52.58”	77°14’08.58”
N8	Gosainwala Johar	Residential	5.1	SW	28°21'00.84"	77°08'08.20"

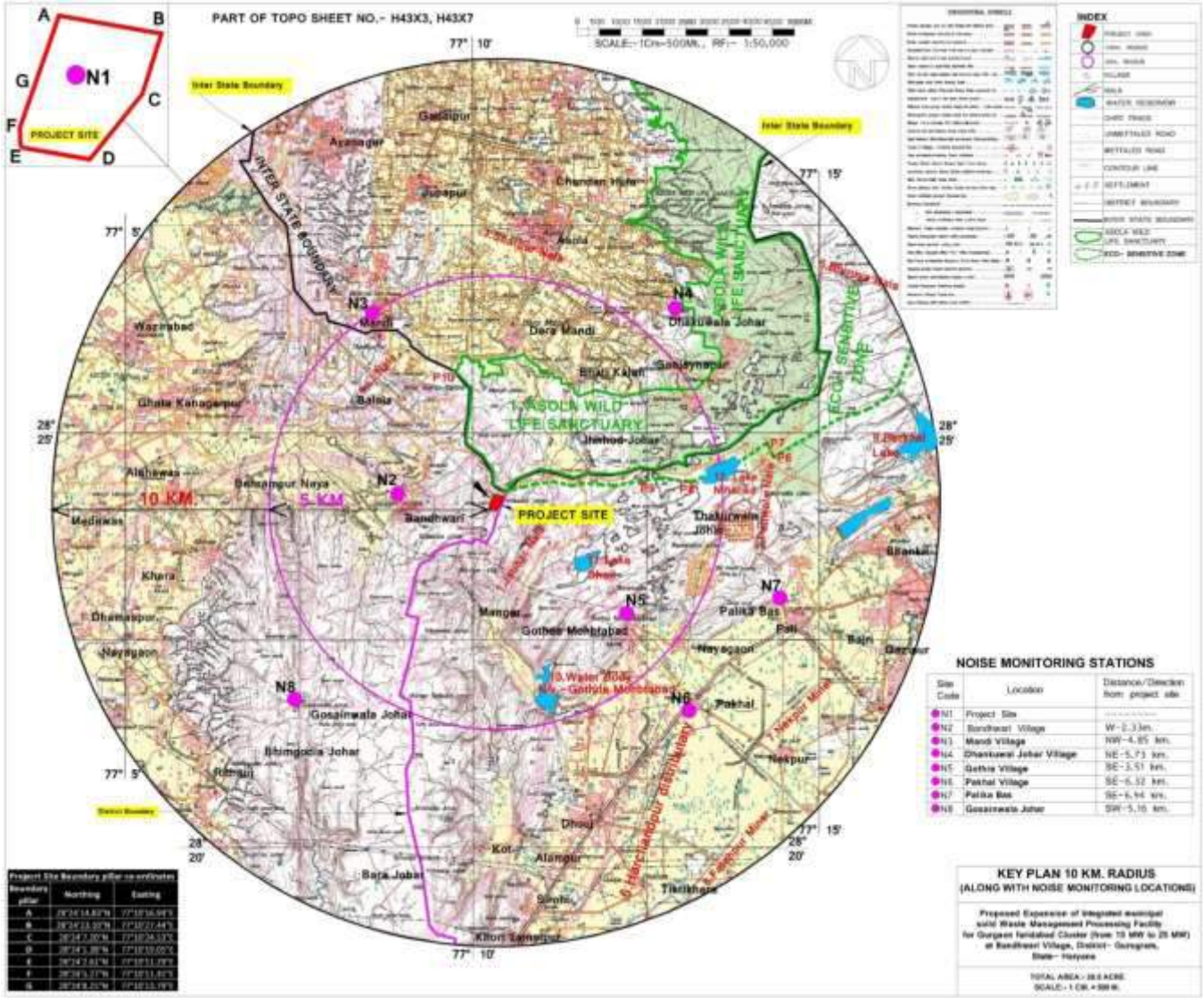
Table 3.14 Noise Levels in the Study Area –db (A)

Code	Name of the Location	**Area Category**	Average Noise Level in dB(A)	
			Day Time	Night Time
N1	Project Site	Industrial	56.1	40.6
N2	Bandhwari	Residential	55.0	36.9
N3	Mandi	Residential	55.7	38.6
N4	Dhakuwala Johar	Residential	52.7	37.0
N5	Gothda Mohtabad	Residential	49.0	35.2
N6	Pakhal	Residential	46.6	36.6
N7	Palika Bas	Residential	50.3	38.1
N8	Gosainwala Johar	Residential	48.5	36.5

Observations

The values of noise observed in some of the rural areas are primarily owing to vehicular traffic and other anthropogenic activities. In rural areas wind blowing and movements of birds would contribute to noise levels especially during the nights. The day equivalents during the study period are range between 46.6 to 56.1dB (A), whereas the night equivalents were in the range of 35.2 to 40.6dB (A). From the results it can be seen that the day equivalents and the Night equivalents were within the Ambient Noise standards of industrial & residential as per the Noise Pollution (Regulation & Control) Rules, 2000.

Figure 3.4 Noise Sampling Location Map



3.4.5 Soil Quality

The study on soil quality establishes the baseline characteristics in the study area surrounding the project site. The study has been addressed with the following objectives to determine:

- The base line characteristics.
- The soil characteristics of proposed project site.
- The impact of industrialization/ urbanization on soil characteristics.
- The impacts on soils from agricultural productivity point of view

Criteria adopted for selection of sampling locations

For studying the soil types and soil characteristics, 8 sampling locations were selected to assess the existing soil conditions representing various land use conditions and geological features. Homogenized soil samples collected at different locations were packed in a polyethylene plastic bag and sealed. The sealed samples were sent to laboratory for analysis. Important physical and chemical parameters were determined for all samples.

Table 3.15 Soil Sampling Locations

Code	Name of the Location	W.R.T. Site		Type of Sample	Latitude (N)	Longitude (E)
		Distance km	Direction			
S1	Project Site	-	-	IMSWM site	28°24'13.25"	77°10'24.15"
S2	Bandhwari	2.3	W	Agricultural Land	28°24'35.16"	77°09'20.44"
S3	Mandi	4.8	NW	Agricultural Land	28°26'23.29"	77°08'27.04"
S4	Dhakuwala Johar	5.7	NE	Agricultural Land	28°25’35.04”	77°13’28.08”
S5	Gothda Mohtabad	3.5	SE	Agricultural Land	28°22’40.05”	77°13’05.28”
S6	Pakhal	6.3	SE	Agricultural Land	28°21’47.42”	77°13’14.27”
S7	Palika Bas	6.9	ESE	Agricultural Land	28°22’52.58”	77°14’08.58”
S8	Gosainwala Johar	5.1	SW	Agricultural Land	28°21'00.84"	77°08'08.20"

Figure 3.5 Soil Sampling Location Map

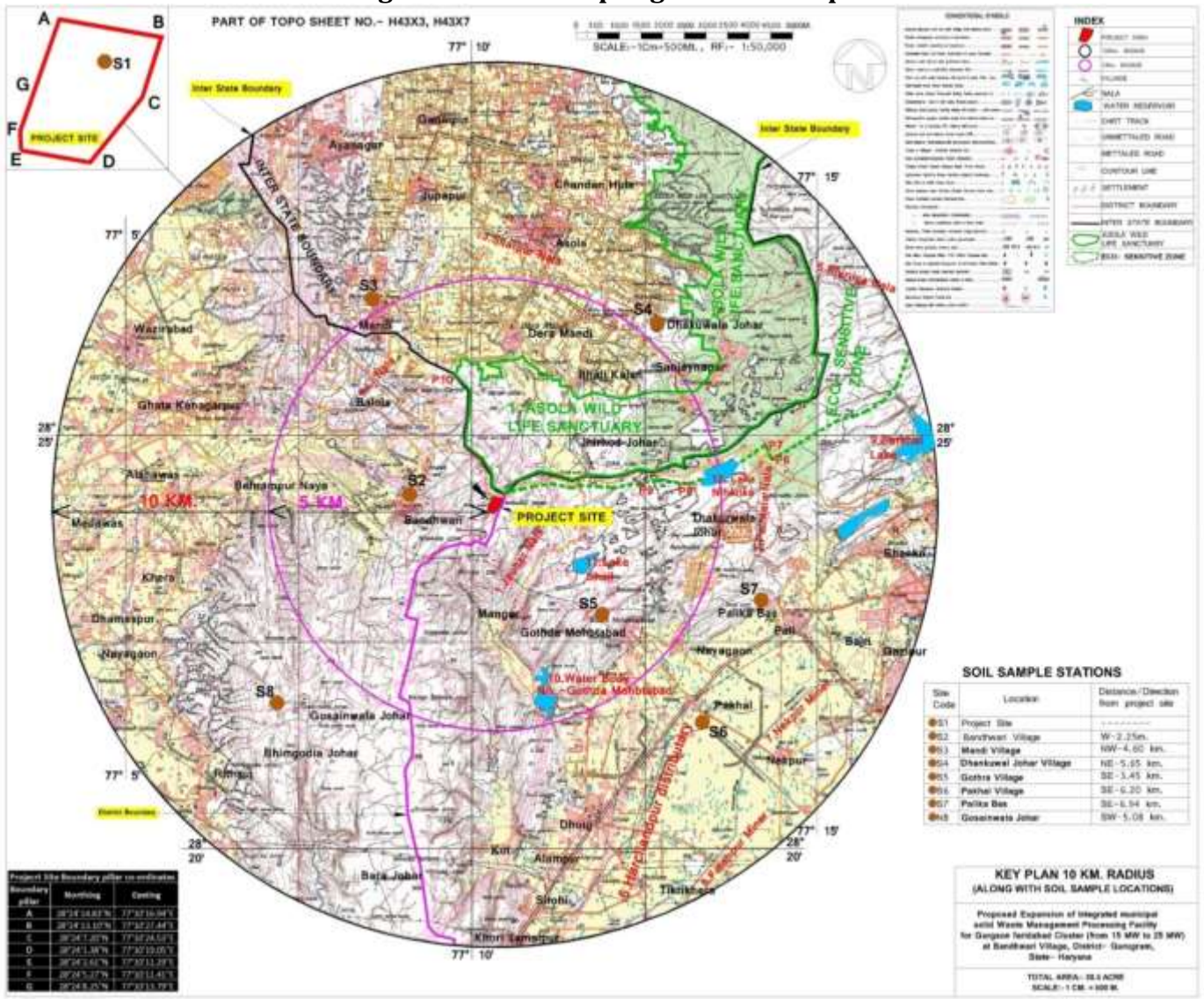


Table 3.16 Soil Analysis Results

Parameter	Unit	S1	S2	S3	S4	S5	S6	S7	S8	Standard Soil Classification – (Indian Council of Agricultural Research, New Delhi)
Colour	-	Brownish	Brownish	Brownish black	Yellowish brown	Brownish black	Brownish	Brownish black	Brownish	-
PH		6.89	7.20	7.35	7.29	7.41	7.73	7.54	7.32	Acidic<6.0, Normal to Saline 6.0-8.5, Tending to become Alkaline8.6 to 9.0, Alkaline above 9.
Electrical Conductivity	µS/cm	458.6	160.7	132	332	332.6	85.55	579.7	441.2	Normal<1000, Critical for germination 1000-2000, Critical for growing 2000 - 4000, Injurious to most crops>4000
Permeability	Cm/hr	1.10	1.00	1.20	1.10	1.00	1.00	1.10	1.10	-
Water Holding Capacity	%	45.95	48.47	48.72	44.22	43.83	40.90	42.68	41.08	-
Bulk Density	gm/cc	1.25	1.27	1.26	1.22	1.36	1.32	1.18	1.34	-
Moisture	%	1.94	4.83	2.42	3.58	12.48	11.62	9.09	5.24	-
Porosity	%	43.77	41.53	45.82	49.34	42.02	39.47	46.25	40.56	-
Organic Carbon	%	0.54	0.38	0.69	0.14	0.47	0.35	2.11	0.46	Low < 0.5 , Medium 0.5 – 0.75, High >0.75
Organic Matter	%	0.94	0.65	1.19	0.25	0.82	0.60	3.64	0.80	-
Calcium as Ca	mg/Kg	9.60	8.00	11.20	6.40	12.80	6.40	8.00	9.60	-
Magnesium	mg/kg	2.88	1.92	3.84	1.92	3.84	2.88	1.92	0.96	-

Parameter	Unit	S1	S2	S3	S4	S5	S6	S7	S8	Standard Soil Classification – (Indian Council of Agricultural Research, New Delhi)
as Mg										
Available Potassium as K	kg/hac	146.5	138.28	126.92	143.75	179.55	156.61	163.43	176.87	Low below 110, Medium 110-280 High above 280
Available Nitrogen as N	Kg/Ha	245.7	321.3	144.9	151.2	371.7	289.8	340.2	270.9	Low below 280, Medium 280-560, High above 560
Total Sodium	%	1.56	1.68	0.98	0.84	0.83	0.88	1.06	1.14	-
Available Phosphorous as P	Kg/Ha	32.25	53.42	73.32	39.46	35.28	85.08	45.82	38.86	-
Chloride	%	0.0063	0.0013	0.0006	0.0043	0.0071	0.0014	0.017	0.0033	-
Copper	%	0.0028	0.0039	0.0042	0.0044	0.0036	0.0038	0.0024	0.0040	-
Zinc	%	0.0026	0.0022	0.003	0.0042	0.0039	0.0029	0.0044	0.0034	-
Boron as B	%	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	-
Texture	%	Sandy loamy	Sandy loamy	Sandy loamy	Sandy loamy	Sandy loamy	Sandy loamy	Sandy loamy	Sandy loamy	-
Sand	%	62	63.4	54.9	51.3	62.3	40	54.8	66.3	-
Silt	%	22.4	23.8	32.7	36.7	21.8	34.2	35	20.8	-
Clay	%	15.6	12.9	12.4	12	15.9	11.1	25	12.9	-
Sodium Absorption Ratio	meq/100gm	1.27	1.08	1.42	1.04	1.41	1.26	1.05	0.77	-
Cation Exchange Capacity	meq/100gm	1.42	1.33	1.38	0.93	1.51	1.06	1.10	1.20	-

Observations

- The pH values in the study area are varying from **6.89 to 7.54** indicating that all soils are falling in normal to saline class.
- The electrical conductivity in the study area is varying from **85.5 to 579.9 µs/cm** indicating that all samples are falling in normal range.
- The other important parameters for characterization of soil for irrigation are N, P and K are known as primary nutrients and Ca, Mn and S as secondary nutrients. The primary and secondary nutrients are known as major elements. The classification is based on their relative abundance, and not on their relative importance.
- The available potassium in the study area is varying between **126.92 to 179.55 Kg/Ha** indicating that all samples are falling in medium range.

3.4.6 Biological Environment

The biological study of the area has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment.

Objective of the Study

The objectives of this study were as follows:

- To collect Baseline data for the study along with a description of the existing terrestrial, wetland and aquatic vegetation.
- To assess scheduled species in the proposed site (Rare, endangered, critically endangered, endemic and vulnerable).
- To identify locations and features of ecological significance.
- To identify Impact of proposed project before, after and during development phase.

Methodology for Flora and Fauna Survey

Flora Survey

- Identification and documentation of Tree, shrub, herb, climber and grass species.
- Analysis of scheduled taxa of the proposed site and study area.

Fauna Survey

- Identification and documentation of Avian, Reptilian, Amphibian, Mammal and other faunal diversity.
- Observations by direct and indirect evidences, trails. (Sighting during ecological studies, pugmarks, fecal material present on Bern of path, urine marks, landering, dropping below huge trees.)
- Identification of birds by recording voice of the birds during day and night. Study of habitats of the birds (old wells, old closed houses, old trees trunks, etc.)
- Analysis of Scheduled species.
- Study of Habitat/microhabitat for the faunal elements in the project site and surrounding areas within 10 km range from the site.
- Records of the forest department and discussion with forest officials.

- The presence of wildlife was also confirmed from the local inhabitants depending on the animal sightings and the frequency of their visits in the project area.
- In addition review of secondary data was another source of information for studying the fauna of the area.

Flora: The present study on the floral assessment for the project activity is based on field survey of the area. The plant species were also identified with the help of taxonomists of related fields and nearby Institutions. Besides the collection of plant species, information was also collected with vernacular names of plant species made by local inhabitants. In this process the whole study area was divided into different sections to get the maximum diversity of plant species. The sampling sites were selected based on land use pattern, topography and floristic composition of the study area. The other relevant data on bio-Diversity, in the study area have been collected from secondary sources like forest and wild life departments. An authenticate list of fauna was procured from the Inspector Wildlife, HO Shona, District Gurgoan is attached as annexure -XIII The plant species found in the area are mentioned below.

Also, the boundary of Asola Wildlife Sanctuary is situated at 300 m NE direction from the project site**.**

Figure no. 3.6: Vegetation pattern in the study

Peacock in Buffer zone

Shikra flying in core zone

Monkey in core Zone

Red-wattled lapwing Near pond

Figure 3.7 – Faunal diversity and tracks and signs observed in the study area

Flora in Study Area- list of flora is given below:

Table- 3.17 List of Flora In The Study Area

S.No.	Botanical Name	Common Name	Family
Trees			
1)	*Polyalthia longifolia*	Ashok	Annonaceae
2)	*Acacia nilotica*	Babul	Mimosaceae
3)	*Aegle marmelos*	Bel	Rutaceae
4)	*Cassia fistula*	Amaltas	Fabaceae
5)	*Dalbergia sissoo*	Shisham	Fabaceae
6)	*Ficus racemosa*	Gular	Moraceae

7)	*Cordia dichotoma Forest .f*	Gunda , Lisoda	Boraginaceae
8)	*Albizzia lebbeck (Linn)Benth*	Safed Siris	Mimosaceae
9)	*Phoenix sylvestris*	Khajur	Arecaceae
10)	*Psidium guajava*	Amrud	Myrtaceae
11)	*Syzygium cumini*	Jambu	Myrtaceae
12)	*Tamarindus indica*	Khati Amli	Fabaceae
13)	*Ziziphus jujuba*	Bor	Rhamnaceae
14)	*Azadirachta indica*	Neem	Meliaceae
15)	*Pongamia pinnata*	Karanj	Fabaceae
16)	*Cassia siamea*	Kassod	Caesalpiniaceae
17)	*Butea monosperma*	Palas	Fabaceae
18)	*Ficus religiosa*	Pipal	Moaceae
19)	*Wrightia tinctoria*	Safed kuda	Apocynaceae
20)	*Tectona grandis*	Sagwan	Verbenaceae
21)	*Dalbergia sisoo Roxb.*	Sisam.	Papilionaceae
22)	*Nyctanthes arbor-tristis*	Harsingar	Oleaceae
23)	*Annona squamosa*	Sitaphal	Annonaceae
24)	*Leucaena leucocephala*	Subabhul	Caesalpiniaceae
25)	*Ficus Bengalensis*	Bargad	Moraceae
26)	*Terminalia arjuna*	Arjun	Combretacea
27)	*Bambusa spp.*	Bamboo	Bambusoideae
28)	*Acacia leucophloea*	Safed babul	Fabaceae
29)	*Ailanthus excelsa roxb*	Ardusa	Simaroubaceae
30)	*Bauhinia variegata*	Kachnar	Fabaceae
31)	*Morus alba*	*Shahtut*	*Moraceae*
32)	*Eucalyptus globulus*	*Nilgiri*	*Myrtaceae*
33)	*Pithecellobium dulce*	*Kikar*	*Mimosaceae*
34)	*Pongamia pinnata (Linn.)Pierre*	*Karanj*	*Papilionaceae*
35)	*Artocarpus heterophyllus*	*Jackfruit*	*Moraceae*
36)	*Nerium oleander*	Kanker	Apocynaceae
37)	*Terminalia bellirica*	Baheda	Combretaceae
38)	*Cassia fistula*	Amaltas	Fabaceae
39)	*Melia azedarach*	Bakan	Meliaceae
Shrub & Herbs			
40)	*Ipomoea carnea*	Besharam	Convolvulaceae
41)	*Xanthium strumarium*	*Ban-Okra*	Asteraceae
42)	*Ricinus communis*	Arand	Euphorbiaceae
43)	*Chenopodium album*	white goosefoot	Amaranthaceae
44)	*Ervatamia divaricata*	Chandani	Apocynaceae
45)	*Carissa opaca*	Karonda	Apocynaceae
46)	*Lantana camara*	Ghaneri	Verbenaceae
47)	*Calotropis procera*	Aakra	Asclepiadaceae
48)	*Solanum surattense*	Bhuiringani	Solanaceae
49)	*Dalura metel*	Dhotra	Solanaceae

50)	*Parthenium hysterophorus*	Gajar grass	Asteraceae
51)	*Tridax procumbens*	Kambarmodi	Asteraceae
52)	*Euphorbia hirta*	Mothi dudhi	Evphorbiaceae
53)	*Argemone mexicana*	Pila dhtura	Papaveraceae
54)	*Cassia tora*	Tarota /Takla	Caesalpiniaceae
55)	*Ocimum sanctum*	Tulsi	Labiatae
56)	*Achyranthus aspera*	Aghada	*Amaranthaceae*
57)	Jatropha Curcas	Ratanjot	Euphorbiaceae
58)	*Capparis deciduas (Forest)*	Ker	Capparidaceae
59)	*Cactus spp.;*	*Cactus*	Cactaceae
60)	*Acacia catechu*	*katha*	Leguminosae
61)	*Phyllanthus emblica*	*Amla*	Phyllanthaceae
Grasses			
62)	*Apluda mutica*	Mauntian grass	Poaceae
63)	*Cynodon dactylon*	Doob	Poaceae
64)	*Cyperus rotundus*	Motha	cyperaceae
65)	*Saccharum spontaneum*	kans	Poaceae

Fauna Study Area

A general faunal survey was carried out for the study area. List of fauna found in the buffer zone is given in Table 3.18.

Table- 3.18 List of Fauna In The Buffer Zone

S. No.	Vernacular Name	Scientific name	Family	Schedule
Avifauna				
1.	Red-wattled lapwing	*Vanellus cinereus*	Charadriidae	No mention
2.	Baya weaver	*Ploceus philippinus*	Ploceidae	Schedule IV
3.	Grey francolin	*Francolinus pondicerianus*	Phasianidae	Schedule IV
4.	Common hoopoe	*Upupa epops*	Upupidae	No mention
5.	Indian Roller	*Coracias benghalensis*	Coraciidae	Schedule IV
6.	White-throated kingfisher	*Halcyon smyrnensis*	Alcedinidae	Schedule IV
7.	Green bee-eater	*Merops orientalis*	Meropidae	No mention
8.	House swift	*Apus affinis*	Apodidae	No mention
9.	Rock Pigeon	*Columba livia*	Columbidae	Schedule IV
10.	Laughing dove	*Streptopelia senegalensis*	Columbidae	Schedule IV
11.	Large grey babbler	*Turdoides malcolmi*	Timaliinae	Schedule IV
12.	Jungle babbler	*Turdoides striatus*	Timaliinae	Schedule IV
13.	Intermediate egret	*Mesophoyx*	Ardeidae	Schedule IV

S. No.	Vernacular Name	Scientific name	Family	Schedule
		intermedia		
14.	Cattle egret	*Bubulcus ibis*	Ardeidae	Schedule IV
15.	House crow	*Corvus splendens*	Corvidae	Schedule V
16.	White-bellied drongo	*Dicrurus caerulescens*	Dicruridae	Schedule IV
17.	Common myna	*Acridotheres tristis*	Sturnidae	Schedule IV
18.	Bank myna	*Acridotheres ginginianus*	Sturnidae	Schedule IV
19.	Wire-tailed swallow	*Hirundo smithii*	Hirundinidae	No mention
20.	Red-rumped swallow	*Hirundo daurica*	Hirundinidae	No mention
21.	Red-whishered bulbul	*Pycnonotus jocosus*	Pycnonotidae	Schedule IV
22.	White-eared bulbul	*Pycnonotus leucotis*	Pycnonotidae	Schedule IV
23.	Red-vented bulbul	*Pycnonotus cafer*	Pycnonotidae	Schedule IV
24.	Large grey babbler	*Turdoides malcolmi*	Timaliinae	Schedule IV
25	Painted sandgrouse	*Pterocles indicus*	Pteroclidae	Least Concern (IUCN 3.1)[1]
26	Spotted owlet	*Athene brama*	Strigidae	Least Concern (IUCN 3.1)[1]
27	Purple sunbird	*Cinnyris asiaticus*	Nectariniidae	Least Concern (IUCN 3.1)[1]
28	Oriental Magpie Robin	*Copsychus saularis*	Muscicapidae	Least Concern (IUCN 3.1)[1]
29	Rufous treepie	*Dendrocitta vagabunda*	Corvidae	Least Concern (IUCN3.1)[1]
30	Indian eagle Owl	*Bubo bengalensis*	Strigidae	Least Concern (IUCN 3.1)[1]
31	Red breasted flycatcher	*Ficedula parva*	Muscicapidae	Least Concern (IUCN 3.1)[1]
32	Black redstart	*Phoenicurus ochruros*	Muscicapidae	Least Concern (IUCN 3.1)[1]
33	Blue capped rock thrush	*Monticola cinclorhyncha*	Muscicapidae	Least Concern (IUCN 3.1)[1]
34	Canary flycatcher	*Culicicapa ceylonensis*	Stenostiridae	Least Concern (IUCN 3.1)[1]
35	Shikra (baaz)	*Astur badius*	Accipitrida	Least Concern (IUCN 3.1)[1]
36	Indian Peafowl	*Pavo cristatus*	phasianidae	Schedule I
Mammals				
1.	Five stripped palm squirrel	*Funambulus pennantii*	Sciuridae	Schedule IV
2.	Common House rat	*Rattus rattus*	Muridae	Schedule V

S. No.	Vernacular Name	Scientific name	Family	Schedule
3.	Grey Musk Shrew	*Suncus murinus*	Soricidae	-
4.	Black buck	*Antilope cervicapra*	Bovidae	Sch I (Part I)
5.	Indian field mouse	*Mus booduga*	Muridae	Schedule V
6.	Neelgai	*Boselaphus tragocamelus*	Bovidae	Schedule III
7	Spotted Deer	*Axis axis*	Cervidae	Schedule III
8	Jackal	*Canis*	Canidae	Schedule II
9	Common Mongoose	*Herpestes edwardsi*	Herpestidae	Schedule II
10	Small Indian Civet	*Viverricula indica*	Viverridae	Sch II (Part I)
11	Porcupine	*Hystrix indica*	Hystricidae	Schedule IV
12	Ruddy Mongoose	*Herpestes smithii*	Herpestidae	Sch II (Part I)
13	Black naped Hare	*L. nigricollis*	Leporidae	
14	Stripped hyena	*Hyaena hyaena*	Hyaenidae	Schedule III
15	Leopard	*Panthera pardus*	Felidae	Schedule I
16	Black buck	*Antilope cervicapra*	Bovidae	Schedule I
Reptiles				
1.	Common House Gecko	*Hemidactylus frenatus*	Gekkonidae	No mention
2.	Oriental Garden Lizard	*Calotes versicolor*	Agamidae	Schedule IV
3.	Yellow-Bellied House Gecko	*Hemidactylus flaviviridis*	Agamidae	No mention
4.	Indian sand boa	*Eryx johnii*	Boidae	Schedule IV
5	Monitor Lizard	*Varanus griseus*	Varanidae	Schedule I
6	Rock python	*Python*	Pythonidae	Schedule I
7	Common Krait	*Bungarus caeruleus*	Elapidae	-
8	Indian Cobra	*Naja Naja*	Elapidae	Schedule II
9	Saw Scaled Viper	*Echis*	Viperidae	
10	Fan throated	*Sitana ponticeriana*	Agamidae	Least concern (IUCN 3.1)[1]
11	Leopard Gecko	*Eublepharis macularius*	Eublepharidae	Least Concern (IUCN 3.1)

Butterflies			
S.No.	**Vernacular Name**	**Scientific name**	**Family**
1.	Common Mormon	*Papilio polytes*	Papilionidae
2.	Common Emigrant	*Catopsilia pomona*	Pieridae
3.	Mottled Emigrant	*Catopsilia pyranthe*	Pieridae
4.	Red Pierrot	*Talicada nyseus*	Lycaenidae
5.	Common Pierrot	*Castalius rosimon*	Lycaenidae
6.	Stripped Tiger	*Danaus genutia*	Nymphalidae
7.	Plain tiger	*Danaus chrysippus*	Nymphalidae

8.	Blue pansy	*Junonia orithya*	Nymphalidae

Source: Survey team in consultation with concern state forest officials, secondary sources and consultation with local people.

NOC from the Principal Chief Conservator of Forest and Chief Wildlife Warden, Haryana was obtained vide letter no. 992 on dated: 09/07/19 certifying that the project is outside the defined Eco-sensitive zone of the Asola Bhatti Wildlife Sanctuary as per Notification dated: 31.05.2019. Hence, clearance from NBWL is not applicable for the project. NOC letter & Asola Bhatti WLS Notification is enclosed as Annexure – VI

A detailed site specific conservation plan & wildlife management plan was prepared and approved by Principal Chief Conservator of Forest & Chief Wildlife Warden, Haryana vide letter no. 992 dated: 09/07/19. This Biodiversity Conservation plan study focused to incorporate some of the biological interventions to further reduce the likely impacts as well as to provide suitable habitats to improve the overall biodiversity attributes evaluated under this study. Detailed conservation plan for the above listed schedule –I & II species is mentioned in section 4.9.1 of chapter 4.

The implementation of specific and general conditions have been implemented with consultation with State Forest Department and details already submitted in the E.C compliance report to various concern government department for their reference.

3.4.7 LAND ENVIRONMENT

(a) Land use of study area (buffer zone)

The satellite based remote sensing is a sustainable global information system because it has the potential to meet the needs and demands of the present and future. The synoptic Average, which provides capability for integration of real time information on regional and global scales, is a unique characteristic of this information system. Its versatility lies in its inherent capability to conceptualize situation to give clear perceptions for defining short term and long term objectives.

An activity could bring about changes in the Land use and Land cover in the vicinity. A data based on Land use and land cover indicates ecosystems existing in and around the centre of an economic activity, to safeguard to allow comparison at a future date to draw conclusions on the nature. The study reported here is with the honest intention of building such a database on land use and land cover in an area within about 10 km radius of the proposed project. The details of the land use present in the 10 km study area are given below in Table 3.19; Land use Land cover Map and satellite imagery shown in figure is shown in Figure 3.6 and 3.7.

TABLE 3.19: LAND USE PATTERN BASED ON SATELLITE IMAGE

Colors	Classes	Area (in Ha.)	Area (in %)
	Built Up Land	6749.99	20.50
	Crop Land	3286.04	9.98
	Fallow Land	676.34	2.05
	Plantation	1343.16	4.08
	Forest	3368.57	10.23
	Open Scrub Land	5985.90	18.18
	Dense Scrub Land	4687.23	14.23
	Waste Land	354.45	1.08
	Water Bodies/ Rivers	1393.82	4.23
	Grazing Land	3951.38	11.99
	Mud Quarries	935.21	2.84
	Mining Area	201.28	0.61
	Total	**32933.37**	**100.00**

a.

FIGURE 3.6: LAND USE / LAND COVER MAP PATTERN OF THE STUDY AREA.

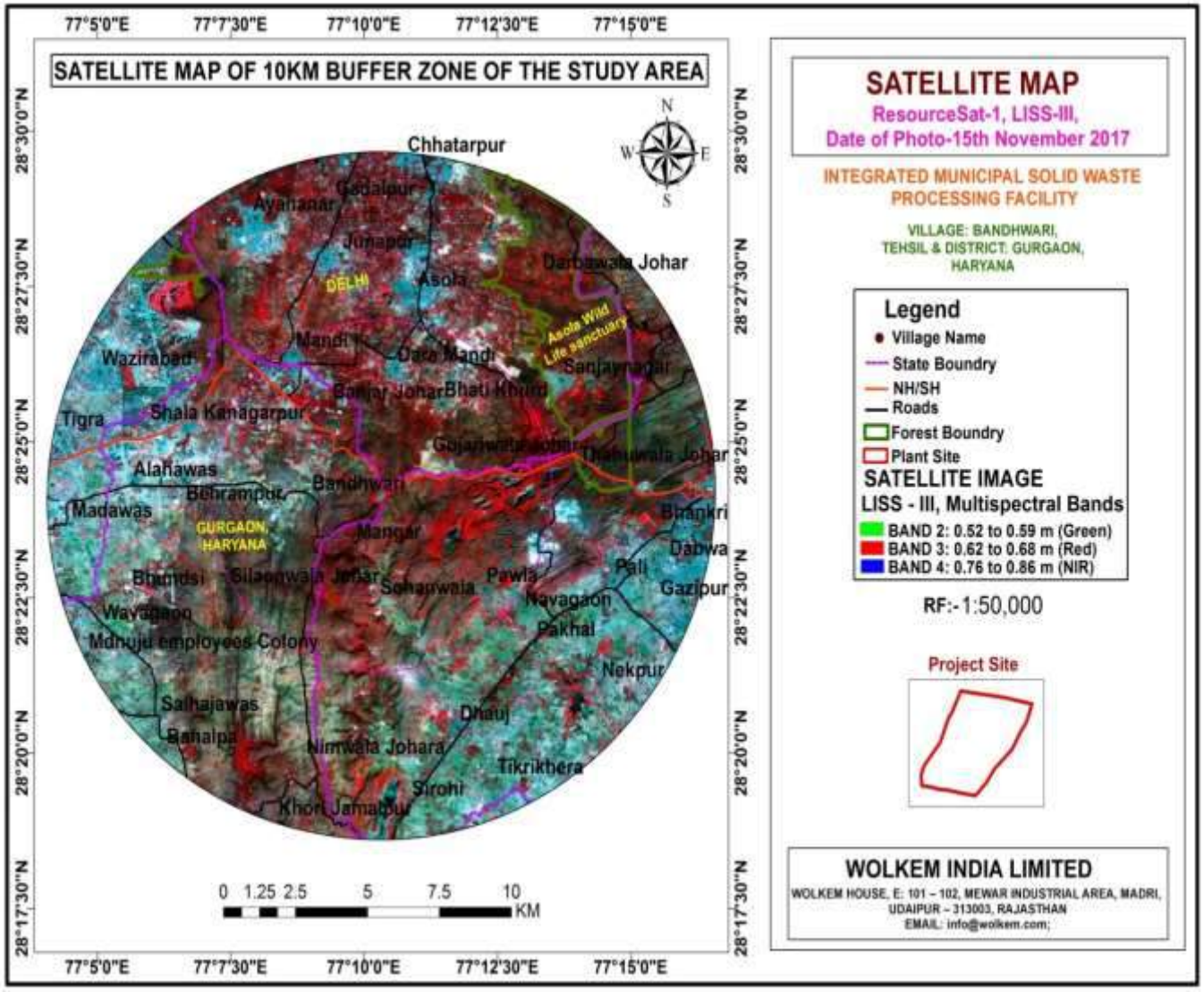
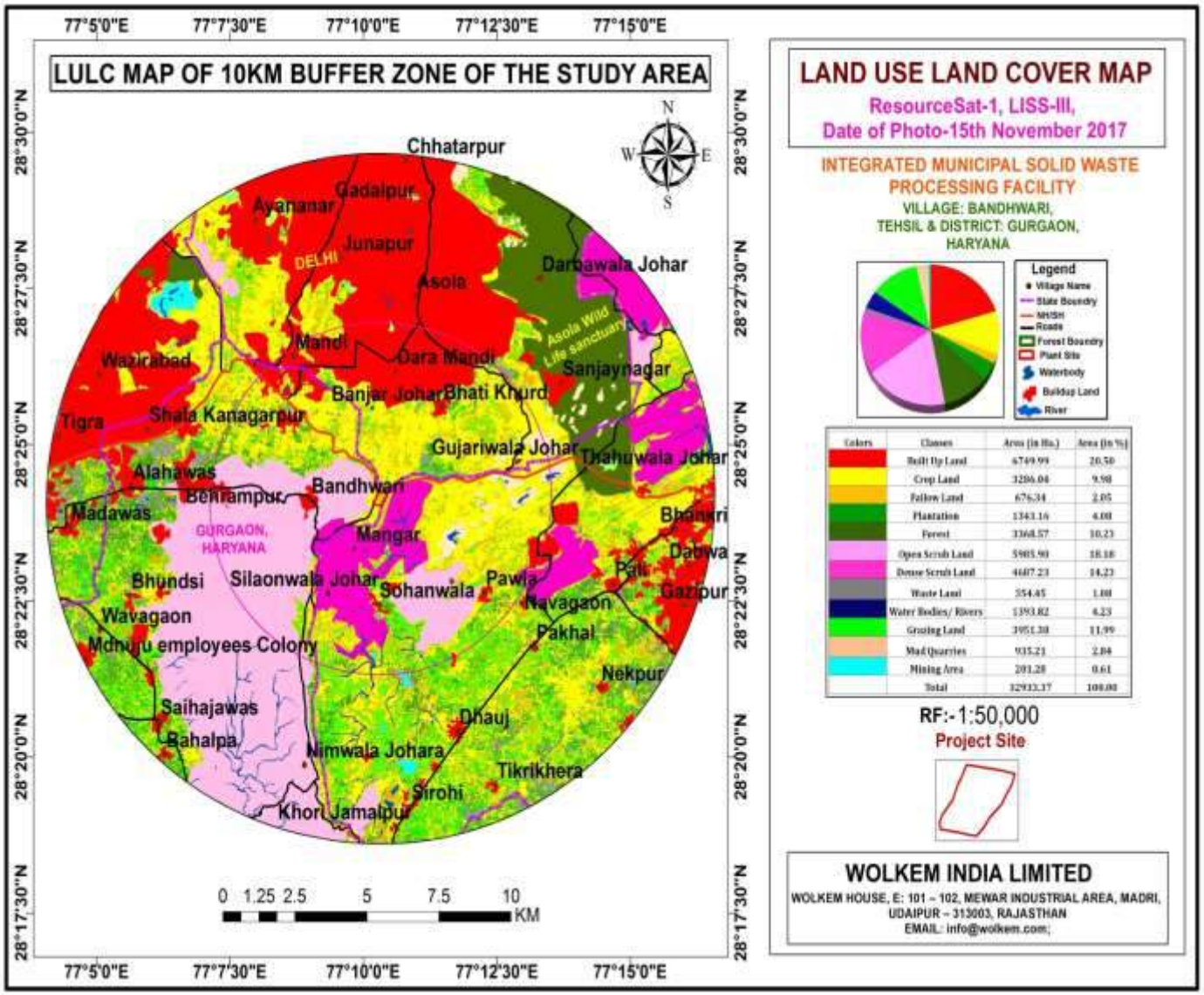


FIGURE 3.7: SATELLITE IMAGE OF 10 KM RADIUS OF THE STUDY AREA



Cropping Pattern

The climatic conditions of a region affect the agricultural cropping pattern of different areas. Thus, it produces different crops. Amongst a host of climatic factors i.e. rainfall, temperature, humidity, wind velocity and duration of sunshine etc. affect the cropping pattern in a significant way. Annual rainfall and its distribution over the entire year and the regimes of diurnal and annual temperatures are by far, the prominent factors affecting agriculture and the life style of the people. Cropping pattern is shown in Table 3.20.

Table- 3.20 Cropping Pattern of the Study Area

Crop	Name	Season
Rabi	Mustard, Wheat, Cumin, Gram, Taramira	September-April
Kharif	Bajra, Moth, Guar, Til, Jowar, Ground Nut, Castor etc.	April-October

b) Land Form, Land Use and Land Ownership

The proposed facilities will be developed inside the existing area available with the Municipal Corporation of Bandhwari Village. The land use details are given below:

Table- 3.21 Land Use Details of the Project Area

Facility	Area (in sq m)	Area (in acres)	% of total land
Waste to Energy Plant Area	26580	6.56	21.57
MSW processing area	13590	3.35	11.03
Roads/ Amenities	11080	2.7	9
Sanitary Landfill	24680	6.0	20
Green Belt	40666	10.0	33
Drain/Sump	6634	1.6	5.4
Total	**123230**	**30.5**	**100**

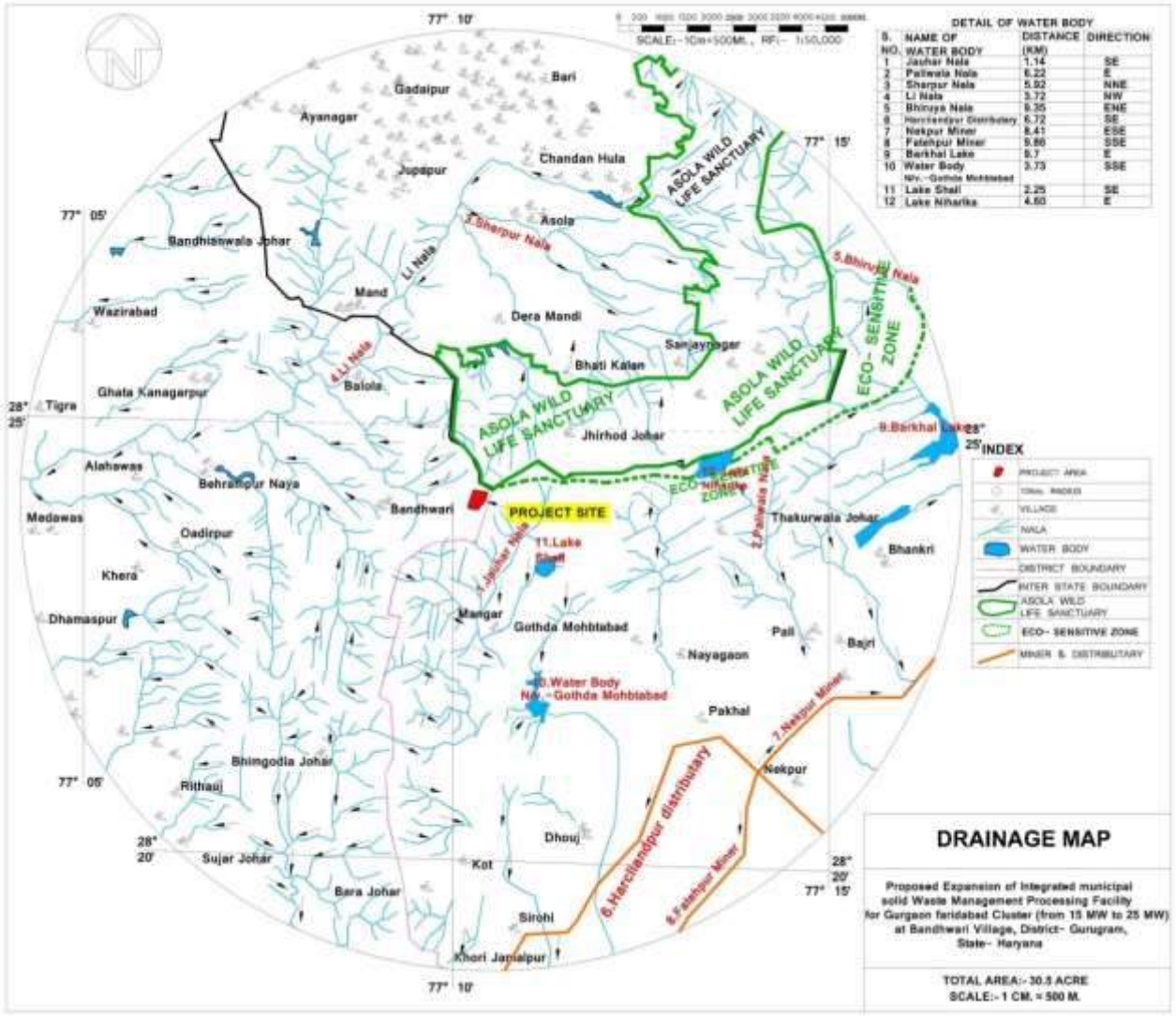
(C) Topography& Drainage

Gurugram district falls in the southern most region of the state of Haryana. Its headquarters is at Gurugram. It lies in between the 27°27'20" and 28°32'25" latitude, and 76°39'39" and 77°20'50" longitude. The height above mean sea level of the district is 190 to 280m. The district comprises of hills on the one hand and depressions on the other, forming irregular and diverse nature of topography. Two ridges i.e. Firozpur Jhirka-Delhi ridge forms the western boundary and Delhi ridge forms the eastern boundary of the district. These hills are northern continuation of Aravalli Hills. The north-western part of the district is covered with sand dunes lying in the westerly direction due to south-western winds.

The drainage of the district is typical of arid and semi-arid areas. It comprises of large depressions and seasonal streams. Important depressions of the district are Khalilpur Lake, Chandani Lake, Sangel-Ujhina lake, Kotla dahar lake and Najafgarh lake. Sahibi and Indrani are two important seasonal streams of the district.

(Refer topographical map & Drainage Map of the study area is refer figure No- 2.2 & 3.8).

FIGURE- 3.8 DRAINAGE MAP OF THE STUDY AREA

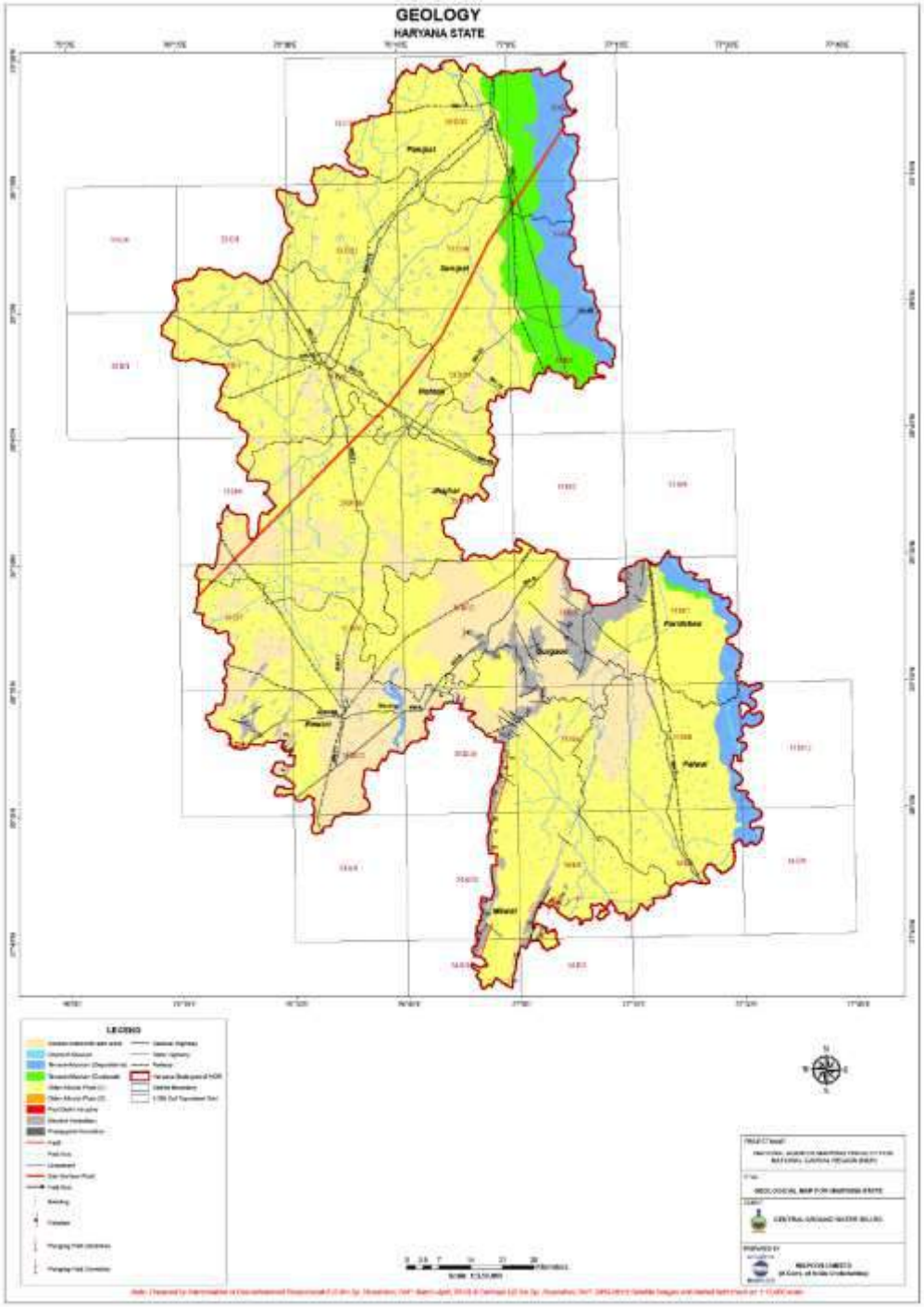


Geology

The Gurugram district is occupied by Quaternary alluvium and Pre-Cambrian meta-sediments of Delhi Super Group. The alluvium comprises of thick beds of fine to coarse-grained sand with alternating layers of thin clays. The generalized geological formation met within the area and their water bearing characteristics are given below:

Geological Age	Stratigraphic Units	Lithological Characters
Recent	Wind-blown sand	Medium to fine grained sand buff coloured over the alluvium
Pleistocene	Newer Alluvium	Stream laid sand, silt, clay and gravel
	Older Alluvium	Semi-consolidated, poorly sorted fine to medium grained sand, silt and clay occasionally mixed with kankar
UNCONFORMITY		
Delhi	Ajabgarh	Sates, Phylites, Quarzites, Mica-schists, with intrusive pagmatites.
	Alwar	Quartizites, Mica-schists with intrusive pagmatites
UNCONFORMITY		
Archeans	Arvalli	Mica-schists, crystalline limestone, Quartzites and schistose conglomerates

FIGURE NO. 3.9 GEOLOGY MAP OF GURUGRAM DISTRICT



(D) Seismicity of the area-

Many parts of the Indian subcontinent have historically high seismicity. Seven catastrophic earthquakes of magnitude greater than 8 (Richter scale) have occurred in the western, northern and eastern parts of India and adjacent countries in the past 100 years.

According to the Bureau of Indian Standards, on a scale ranging from I to V in order of increasing susceptibility to earthquakes, the city lies inside seismic zone IV. This zone is called the High Damage Risk Zone.

FIGURE 3.10: SEISMIC MAP OF INDIA

Following are the varied seismic zone of the Nation, which are prominently shown in the map-

Seismic zone-II- This is said to be the least active seismic zone.

Seismic zone-III- It is includes in the moderate seismic zone.

Seismic zone-IV- This is considered to be the high seismic zone.

Seismic zone-V- It is the highest seismic zone.

3.4.8 SOCIO ECONOMIC ENVIRONMENT OF THE STUDY AREA

An essential part of environmental study is socio-economic environment incorporating various facts related to socio-economic conditions in the area, which deals with the total environment. Socio economic study includes demographic structure of the area, provision of basic amenities viz., housing, education, health & medical services, occupation, water supply, sanitation, communication, transportation, prevailing diseases pattern as well as feature of aesthetic significance such as temples, historical monuments etc. at the baseline level. This would help in visualizing and predicting the possible impact depending upon the nature and magnitude of the project.

Socio-economic study of an area provides a good opportunity to assess the socioeconomic conditions of it. This study will possibly make a change in living and social standards of the particular area benefitted due to the Project. The gross economic condition of the area will be increased substantially due to the existence of this project. It can undoubtedly be said that this project will provide direct and indirect employment and improve the infrastructural facilities and standards of living of the area. The fabrics of socio-economic changes are so complicated that this study would seem to be extremely limited, almost superficial and at time subjective in nature. More thorough and quantified socio-economic study will undoubtedly require vastly longer time and resources and is, therefore, beyond the scope of the present EIA study. The EIA will give a reasonably clear picture of the socio-economic conditions prevailing in the study area**.**

a. Objective of Socio Economic Study

The objectives of this socio-economic study are:

- To conduct socio-economic assessment study in Project Area.

- To know the current socio-economic situation in the region to cover the subsectors of education, health, sanitation, water and food security.
- To recommend practical strategic interventions in the sector.
- To help in providing better living standards.
- To provide employment opportunities.

b. Scope of Study

The scope of socio economic study area as follows:

- To study the Socio-economic Environment of area from the secondary sources.
- To develop a questionnaire for SIA Survey.
- Data Collection & Analysis.
- Prediction of project impact.
- Mitigation Measures

c. Methodology

For socioeconomic study, both qualitative and quantitative methods were adopted. Data regarding the field area were collected secondary sources (published data, website of Directorate of Census for Delhi, Faridabad, and Gurugram District.

Primary sources include data collected through direct field sampling, observations based on schedules, questionnaires etc. distributed to the local persons, senior citizen, Government officials of district and official of villages Panchayat etc.

A suitable format of Questionnaires was developed by us & survey was conducted.

To know the perception of local people on socio-economic impact of proposed project in the area, a field survey was conducted during study period.

Focus Group Discussion (FGD) and Participatory Rural Appraisal (PRA) techniques are the two important tools of participatory method used in the field. Household level contacts and interviews have been undertaken with each family for completing the household socio-economic profile. For individual farmers and community members, qualitative interviews were used since this approach allows a more in-depth investigation into the each interviewee. It also allows people to speak for themselves without their answers being biased by predetermined hypothesis-based

questions. The questionnaire was basically focused to gather respondents´ views from the study areas on the impacts of proposed construction activities.

d. Background of Study Area

The study area is defined as 10 km radius around the project site. The socio-economic parameters i.e. population growth, density, literacy etc. played an important role in determining the impact of the proposed activity directly or indirectly on the human population of the study area. These impacts may be beneficial or detrimental.

e. Demography of the Study Area

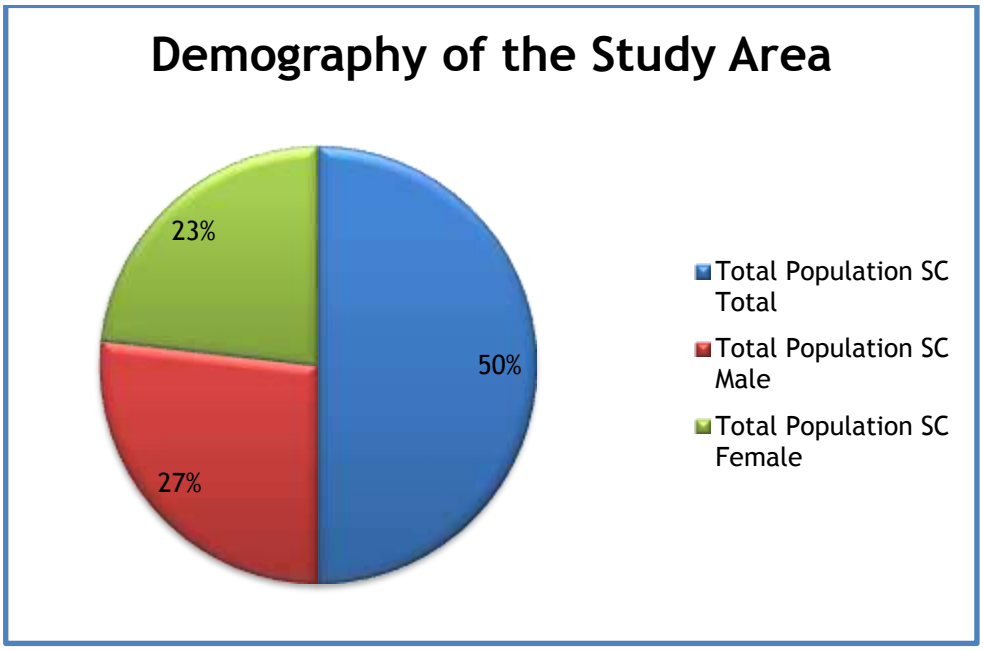
Total population of the study area is 153342 persons. Out of which 82571 (53.8%) are male and 70771 (46.2%) are female. SC total population is 21848 out of which 11656 (53.4%) are male and 10192 (46.6%) are female shown in Table 3.21 and Figure 3.10.

TABLE- 3.21 DEMOGRAPHY OF THE STUDY AREA

S No	Range	Total Villages	Total HH	Total Population			Total Population SC		
				Total	Male	Female	Total	Male	Female
1	Villages of Core Area	8	8680	47866	25857	22009	7936	4255	3681
2	Villages of Buffer Area	20	18636	105476	56714	48762	13912	7401	6511
Total		28	27316	153342	82571	70771	21848	11656	10192

Source: Census 2011.

Figure- 3.11 Demography of the Study Area



f. Workforce

Construction work is labor oriented because it covers large activity area. Hence requires large population of man and women for construction work, transportation and storage work. From employment point of view, labors are low paid worker. They prefer to be engaged in nearby area so as to save the travel cost and time. Therefore availability of worker in study area is important. Table 3.22 presents statistics of work force available in study area. The total population in the study area is 153342 persons out of which 48788 is working and 51557 is Non-working population. In core area the total population is 47866 out of which working population is only 15274.

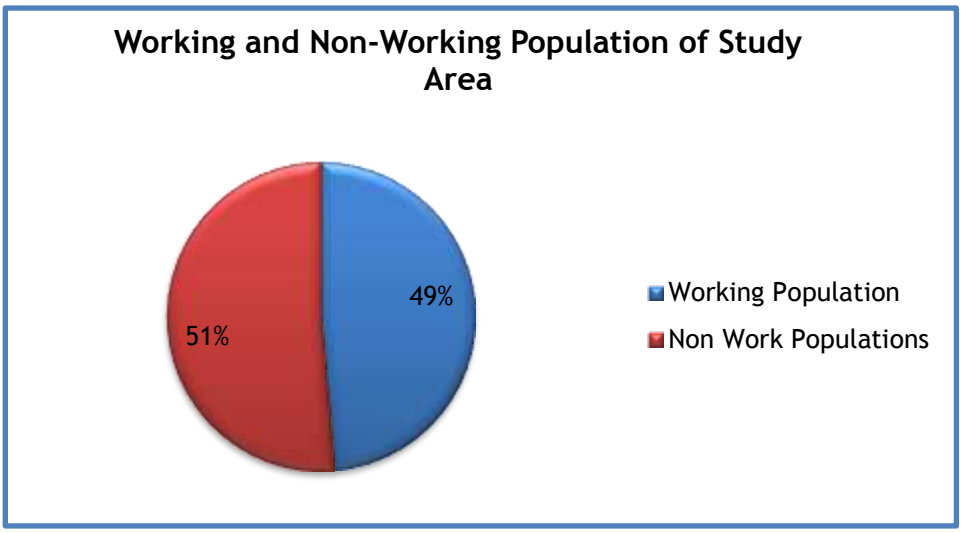
TABLE- 3.22 WORKING AND NON-WORKING POPULATION OF STUDY AREA

Sr. No	Range	Total Villages	Total Population	Working Population			Main Working		Marginal Working			Non-Working			
				Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
1	Cor	8	47866	15	11	333	12	10	255	23	15	772	25	10	148

Sr. No	Range	Total Villages	Total Population	Working Population			Main Working		Marginal Working			Non-Working			
				Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	e			274	944	0	927	369	8	47	75		173	319	54
2	Buffer	20	105476	33514	27098	6416	30164	25412	4752	3350	1686	1664	26384	11842	14542
Total		28	153342	48788	39042	9746	43091	35781	7310	5697	3261	2436	51557	22161	29396

Source: Census 2011

FIGURE- 3.12 WORK PROFILE OF THE STUDY AREA



Among the worker there are two category i.e. main worker and marginal worker. Main worker are those who work for the major part of the year i.e. 280 days or more and marginal worker is one who work for less than 6 months in a year. Other category is of non-worker, those who are either under the age of 15 years or more than 64 years. This class is not fit for any work. Among the working population 88.3 % population is main worker, mean they get work more than 280 day in a year and

11.6 % are marginal worker. So from working population point of view the region is comparatively well off.

g. Occupational Structure

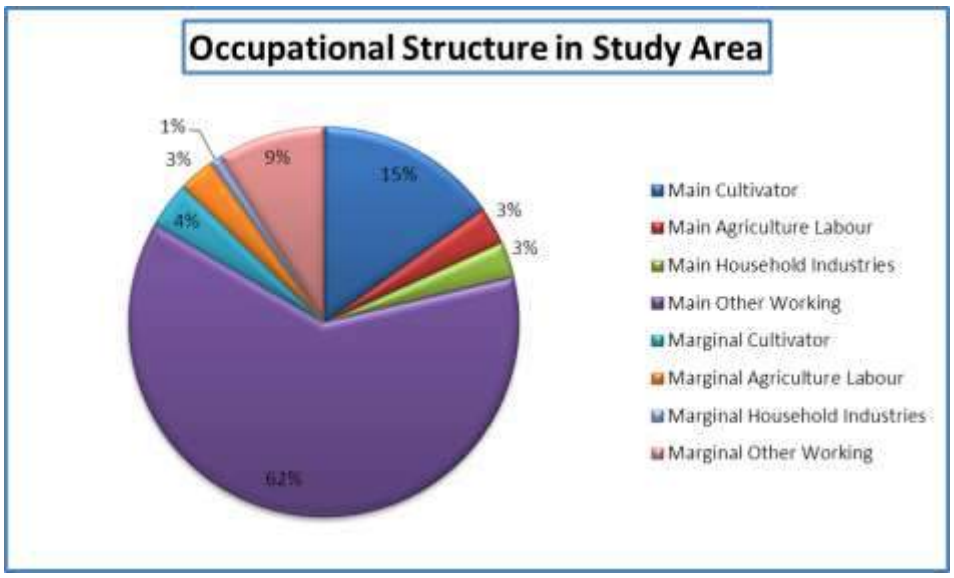
Occupational structure of an area shows the nature and status of employment activities in the area. Out of the total population 31.8% population is working which is further grouped in eight fold classification as shown in Table 3.23. Main occupation of people in this area is agriculture. Out of total working population 2.7% are cultivators, 0.68% are marginal cultivators and 0.54% are engaged as agriculture labor. Villages covered under core area have also been dominated by agricultural activities.

TABLE- 3.23 OCCUPATIONAL STRUCTURE IN STUDY AREA

Sr.No.	Range	Total Villages	Total Population	Working Population	Main Cultivator	Main Agriculture Labour	Main Household Industries	Main Other Working	Marginal Cultivator	Marginal Agriculture Labour	Marginal Household Industries	Marginal Other Working
1	Core Area	8	47866	15274	1291	412	318	10906	402	157	159	1629
2	Buffer Area	20	105476	33514	2900	447	489	6176	651	667	94	828
Total		28	153342	48788	4191	859	807	17082	1053	824	253	2457

Source: Census 2011

FIGURE- 3.13 OCCUPATIONAL STRUCTURE OF THE STUDY AREA



It can be inferred from the table that out of total 153342 working population, in the study area 4191 people are engaged in cultivation followed by 1053 people as marginal cultivators. Second category of working population is engaged in other than agricultural work i.e. called main other working population like secondary and tertiary occupation.

h. Literacy Details

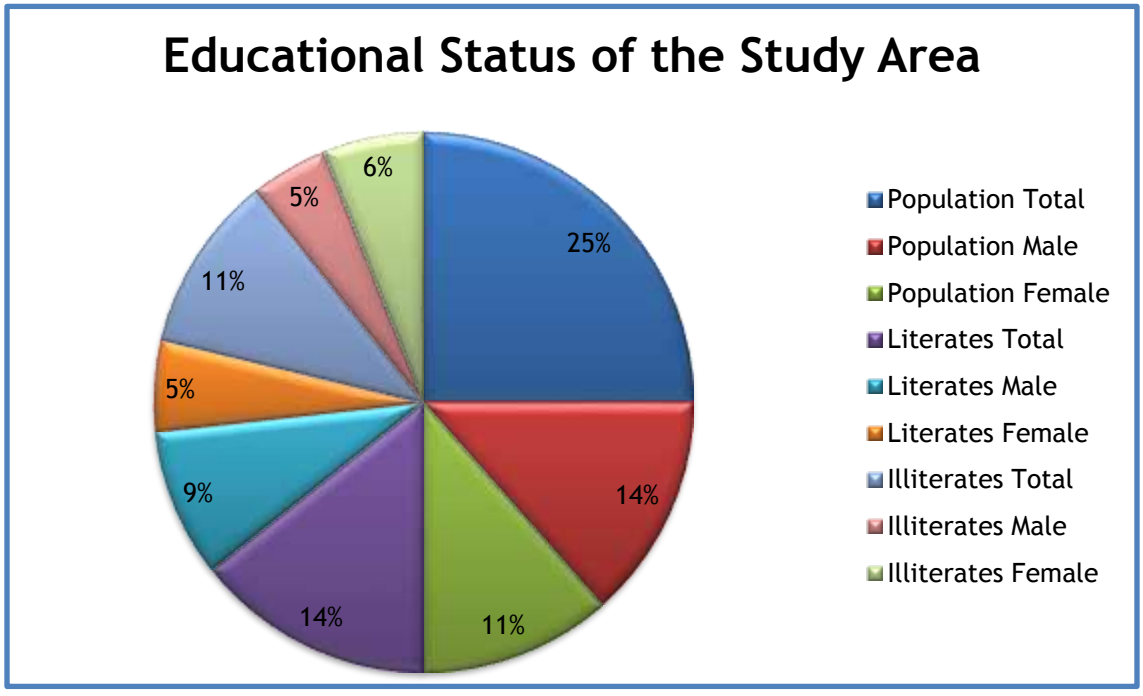
Literacy Rate is the amount of people in a country with the ability to read and write. The analysis of the literacy levels is done in the study area. Literacy in any region is key for socio-economic progress and the Indian literacy rate grew to 74.04% in 2011 from 12% at the end of British rule in 1947. Although this was a greater than six fold improvement, the level is well below the world average literacy rate of 84% and of all nations, Table 3.24 and gives the educational status of the study area.

TABLE- 3.24 EDUCATION STATUS OF STUDY AREA

Sr.No.	Range	Total Villages	Population			Literates			Illiterates		
			Total	Male	Female	Total	Male	Female	Total	Male	Female
1	Core Area	8	47866	25857	22009	27504	17065	10439	20362	8792	11570
2	Buffer Area	20	105476	56714	48762	64692	39213	25479	40784	17501	23283
Total		28	153342	82571	70771	92196	56278	35918	61146	26293	34853

Source: Census 2011

FIGURE- 3.14 EDUCATIONAL STATUS OF THE STUDY AREA



The table shows that out of total population only 92196 (60.1%) are literates and 61146 (39.9 %) are illiterates. If we look at male-female ratio, there is a wide gender disparity. Out of total literate population, there are 61 % male literates while female literates are 38.9% only in the region. Among illiterates there are 43% male and 57% females to total illiterates. This analysis shows that literacy in the region is low. Hence, the potential availability of unskilled labor is more in this region.

i. Infrastructure Facilities in the Study Area

Infrastructure is basic physical and organizational structures needed for the operation of a society or enterprise, or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure of development. It is an important term for judging a country or region's development. The term typically refers to the technical structures that support a society, such educational institutions, medical facilities banking facilities, telecommunications and so forth, and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions.

The study area is well connected to road network, communication facilities, and amenities like hospitals, schools, post offices and others.

Drinking Water Facility

Drinking water is the primary need for survival of the men, animal and plant kingdom. The state spent thousand and thousand Crore rupees to provide drinking water to the population of the state. Table 3.25 shows that the region gets drinking water from well, tube well and hand pump. It means the water is directly consumed. No treatment is given to purify the water.

Table- 3.25 Drinking Water Facilities in the Study Area

Sr. No.	Range	Total Villages	Well Water	Tank Water	Tube Well Water	Hand Pump
1	Core Area	8	Yes	Yes	Yes	Yes
2	Buffer Area	20	Yes	Yes	Yes	Yes
Total		**28**	Yes	Yes	Yes	Yes

3.4.8.1 Primary Socio Economic Survey

a. Sampling Method

A judgmental and purposive sampling method was used for choosing respondents of various sections of the society i.e. Sarpanch, adult males and females, teachers, medical practitioners, businesspersons, agriculture laborers, fishermen, unemployed group etc. Judgmental and purposive sampling method includes the right cases from the total population that helps to fulfil the purpose of research needs.

b. Data Collection Method

Data collection is a term used to describe a process of preparing and collecting data, for example, as part of a process improvement or similar project. The purpose of data collection is to obtain information to keep on record, to make decisions about important issues, to pass information on to others. Primarily, data are collected to provide information regarding a specific topic. Data collection usually takes place early on in an improvement project, and is often formalized through a data collection plan which often contains the following activity.

Pre collection activity — agree on goals, target data, definitions, methods
Collection — data collection
Present Findings — usually involves some form of sorting analysis and/or presentation
Main types of data collection include census, sample survey, and administrative by-product and each with their respective advantages and disadvantages. A census refers to data collection about everyone or everything in a group or population and has advantages, such as accuracy and detail and disadvantages, such as cost and time.

c. Types of Data

The data needed for a social science research may be broadly classified into

- Data pertaining to human beings,
- Data relating to organization,
- Data pertaining to territorial.
- Field Survey and Observations

Field survey involved the collection of primary data or information that was new. This was collected through surveys and questionnaires that are made out specifically for this purpose.

Observations were conducted on nearly any subject matter and the kinds of observations were depending on survey question. Field Survey and Observations were made at each sampling village and the quality of life of that region was studied. Visits were made at hospitals, primary health centers and sub-centers to know the health status of the region. Various governmental organizations such as statistical department, department of census operations etc. were visited to collect the population details of that region.

d. Interview Method

Surveys were also conducted through interviews. Interviews consisted of asking questions, listening to individuals and recording their responses. At times, it was found that it was more profitable to ask questions to a few individuals instead of carrying out a large-scale questionnaire based survey. The interviews were done very informally e.g. as conversations with people met in the fields, at co-operative stores or block offices. In these meetings, one question leads to the next based on the responses given to the previous one. At the other end of the scale, highly structured interviews often rely on questionnaires or interviews held with mostly closed-ended questions that allowed the respondents only a limited range of possible answers. Structured interview method was used to collect data regarding the awareness and opinions from the sample selected of the various socio- economic sections of the community. The questionnaire mainly highlights the parameters of primary needs. The interview method has the advantage that almost all the perfect sample of the general population was to be reached and respond to the approach. Interview method helped to collect more correct and accurate information as the interviewer was present during the field survey.

Socio-economic survey was conducted in seven villages within the study area located in all directions with reference to the project site. The respondents were asked for their awareness/opinion about the project and their opinion about the impacts of the project, which is an important aspect of socio-economic environment, viz. job opportunities, education, health care, transportation facility and economic status.

According to survey done in the study area, the observations made are as follows:

- In the study area, the main occupation of the villagers is agriculture, labour work and small business of cutlery items etc.

- Most of the houses are in pakka form.
- Villages are well connected by tarred roads with the district place
- Farmers depend mainly on monsoon for agricultural activities.
- Communication facility is good due to better mobile network and transportation facilities.
- All villages are well electrified and use of electricity for all purposes.
- Main language in study area is Haryanvi and Hindi, widely spoken by the population.
- LPG is used by villagers in general, as fuel for cooking; otherwise wood, kerosene etc.

e. Awareness and Opinion

Awareness is the state or ability to perceive, to feel, or to be conscious of events, objects or sensory patterns. In this, level of consciousness, sense data can be confirmed by an observer without necessarily implying understanding. In general, an opinion is a subjective belief, and is the result of emotion or interpretation of facts. An opinion may be supported by an argument, although people may draw opposing opinions from the same set of facts. For assessing the awareness and opinion about the project activity, socio-economic survey was conducted in the sampling villages.

The salient observations drawn through survey are given below-:

- The respondents from almost all the villages were aware about the project activity.
- Some of the respondents have very good opinion about the project and they opined that due to proposed project activity, quality of life of the villages will improve.
- Respondent have suggested minimizing the environmental pollution during and after project activity.
- The availability of Manpower for the project supports the secondary Data as well as during personal interaction. Hence, all the man power required for the projects will be deployed local people only except technical manpower.
- There is a need for strengthening of local facilities such as hospital, school as there will influx of the people.

- Manpower required for dumper operator, Excavator Operator, etc. will be made available locally.
- Training and skill assessment & program has to be identified to provide to villager for their skill improvement

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CHAPTER-IV

ANTICIPATED IMPACTS & MITIGATION MEASURES

4.1 INTRODUCTION

Any development activity in its wake will bring about some impacts associated with its origin, which can be broadly classified as reversible, irreversible, long and short-term impacts, in this chapter, an endeavour has been made to identify various environmental impacts associated with the operation of facility and other activities wherein, there may be chance of pollution.

Based on the possible worst case emission and waste generation from the proposed project and also taking into considering the base line environmental status at the proposed project site, the environmental factors that are likely to be affected (impacts) are identified, quantified and assessed. Both instrumental (positive) and detrimental (negative) impacts are accounted for this purpose.

4.2 METHODOLOGY

The potential impacts on the environment from the proposed project are identified based on the nature of various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site.

4.3 POTENTIAL IMPACTS

The potential significant environmental impacts associated with the project are grouped below.

- Air Environment: Impacts on ambient air quality and odor.
- Water Environment: Impacts on surface and ground water quality and aquatic life.
- Land Environment: Impacts on land use, soil fertility and agriculture
- Biological Environment: Impacts on flora & fauna
- Socio Economics: Impacts on infrastructure and employment
- Indirect Impacts: Impacts on public health and safety and aesthetics

4.4 PREDICTION OF IMPACTS

Impact assessment is carried out for the following phases and presented in the following paragraphs as:

- Impacts during development phase
- Impacts during operation phase

4.5. IMPACTS DURING DEVELOPMENT PHASE

Construction phase works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The impacts due to construction activities are short term and area limited to the construction phase. The impacts will be mainly on air quality, water quality and soil quality.

4.5.1. Impact on Air Quality

The principal potential source of air quality impact arising from the construction of the proposed project is fugitive dust generation. The dust, measurable as Suspended Particulate Matter and Respirable Suspended Particulates would be generated as a result of construction activities. The construction program of the projects shall commence immediately after obtaining statutory clearances.

The potential dust sources associated with construction activities are loading and unloading of the materials, top soil removal, travel over unpaved roads and wind erosion etc.

1. Site development and foundation works
2. Dust generation due to vehicles bringing raw materials
3. Un loading of raw materials, removal of un wanted waste material from site
4. Civil constructions and provision of infrastructure required for various activities proposed.
5. Remediation process for existing legacy waste dump.

Among all the construction and remediation activities, site formation has the highest potential for causing dust nuisance to the nearby air sensitive locations. During the construction of the project, existing houses nearby may be subject to the potential dust impacts.

Mitigation measure-

- The important dust suppression measures proposed will be regular water sprinkling , wet suppression on main haul roads in the project area, this activity will be carried out

at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.

- Limiting vehicle movements at speed of 20 km/h in the project site.
- Temporary tin sheets of sufficient height (3m) will be erected around the site of dust generation or all around the project site as barrier for dust control.
- Tree plantations around the project boundary will be initiated at the early stages.
- Plantation, regular watering will be done, so that the area will be moist for most part of the day.
- To reduce the dust movement from civil construction site to the neighborhood the external part of the building (administration, canteen, etc.) will be covered by plastic sheets.

Given the implementation of proper control measures for dust suppression, no adverse impacts are expected and compliance with the Ambient Air Quality is achieved at ASR's (Air Pollution Sensitive Receivers) at all time.

4.5.2. Impact on Water Quality

Preparation of designated area of land for subsequent development activities involves levelling the ground surface, removal of vegetation, stockpiling, remediation process for existing waste dump and generation of construction waste. Also due to natural phenomenon like precipitation, runoff, etc. the surface water in nearby areas may be contaminated. The site formation may produce large quantities of run-off with high suspended solids loading in the absence of appropriate mitigation measures. This potential problem may be aggravated during rainy season.

Construction of Buildings

In rainy season during the construction phase due to construction of various civil structures site runoff results significant pollution in the receiving water bodies and washing of various construction equipment will also result in water pollution.

Site workshop

The used engine oil and lubricants, and their storage as waste materials as the potential to create impacts if spillage occurs. Waste oil may infiltrate into the surface soil layers, or runoff into local Water courses, increasing hydrocarbon levels. Proper precautionary measures should be taken to prevent any spillage of the above materials and their subsequent runoff into the water bodies.

Presence of workers

During construction, impacts from the workers include waste and wastewater generated from eating areas, and sewage from temporary sanitary facilities. Sewage is characterized by high levels of BOD, ammonia and E.Coli. Significant water quality impact will happen only if the sewage is discharged directly into the receiving waters without any prior treatment.

Mitigation Measures – Water Quality

- During site development necessary precautions will be taken, so that the runoff water from the site gets collected to working pit and if any over flow is, it will be diverted to nearby greenbelt/ plantation area.
- During construction activity all the equipment washed water will be diverted to working pit to arrest the suspended solids if any and the settled water will be reused for construction purposes, and for sprinkling on roads to control the dust emission, etc. The domestic sewage generated will be treated in leachate treatment plan.
- During construction, impacts from the workers include waste and wastewater generated from eating areas, and sewage from temporary sanitary facilities.
- DTRO's will be used to treat leachate generated from existing waste.
- Sewage is characterized by high levels of BOD, ammonia and E.coli. Significant impact on water quality will happen only if the sewage is discharged directly into the receiving waters without any prior treatment

4.5.3. Impact of Noise levels

The major activities, which produce periodic noise, during construction phase, are as Follows:

- Foundation works

- Fabrication of structures
- Plant erection
- Operation of construction equipment
- Movement of vehicles etc.

Mitigation Measures – Noise

All noise generating equipment will be used during day time for brief period of its requirement. Proper enclosures will be used for reduction in noise levels, where ever possible the noise generating equipment will be kept away from the human habitation. Therefore, impact on noise environment due to proposed project would be insignificant. All vehicles entering into the project will be informed to maintain speed limits, and not blow horns unless it is required.

4.5.4 Impact Due to Solid Waste

This category of waste generation in the proposed project is due to different types of raw materials being used during construction stage in general may comprise the following:-

- Cement concrete
- Bricks, tiles
- Cement plaster
- Steel (RCC, door/ window frames, roofing support, railings of staircase etc.)
- Rubble, sand, stone (marble, granite, sand stone)
- Timber/wood
- Paints/varnishes

Besides above there are some major and minor components namely pipes, electrical fixtures, panels, etc. all the above items will be segregated and stored at the site and once the facility is established it will process the same in respective treatment facilities within the site.

Mitigation Measure (Solid Waste)-

The solid waste generated during this period being predominantly inert in nature. Hence maximum effort would be made to reuse and recycle them. The most of the solid waste

material can be used for filing/ levelling of low-lying areas within the site. All attempts should be made to stick to the following measures:

- All construction waste shall be stored within the site itself. A proper screen will be provided so that the waste does not get scattered.
- Attempts will be made to keep the waste segregated into different heaps as far as possible so that their further gradation and reuse is facilitated.
- Reuse of bricks, tiles, stone slabs, timber, piping railings etc. to the extent possible and depending upon their conditions.
- The unearthed soil can be used for levelling as well as for lawn development.

4.6 IMPACT DURING OPERATIONAL PHASE

4.6.1. IMPACT ON LAND ENVIRONMENT AND MITIGATION MEASURES

During the operation phase of the project, the soil may get polluted/contaminated from littering of various kinds of municipal wastes, leakage of leachates and due to fly ash or bottom ash.

Impact on Top Soil

No significant impact is expected on the top soils on and around the site.

Following are proposed management/mitigation measures for land:-

Mitigation Measure-

- To ensure against any chances of soil pollution, it is imperative to establish a well planned solid waste collection, storage and segregation system management at site.
- Only covered trucks will be allowed to enter the site for unloading of municipal solid waste materials, good housing keeping will help to control the contamination of soil.
- All solid wastes from the plant complex are collected properly collected, stored and disposed.
- The proposed landfill shall be constructed in line with Solid Waste Management Rules 2016 and guidelines from CPCB and MoEF&CC.
- No Biomedical waste & Hazardous waste will be accepted for this proposed plant. If found then it will be sent to authorized vendors for its treatment and disposal as per BMW rules 2016 & HW & other waste rules 2016 respectively.
- Fly ash generated will be sold to fly ash brick manufacturer

- Fly ash could also be used as liner or capping on SLF in between MSW layers instead top soil to make soil conservation as its non-hazardous type
- The quenched bottom ash will be lead to bottom ash processing plant which is similar to C&D plant. After the processing which are not recyclable will be sent to sanitary landfill.
- The entire plant site area is well drained and thus there is no leaching of any substances in case of spills, which are well confined and decontaminated.
- Hence, no negative impact on soil quality on the project site is expected due to the proposed project activities.

4.6.2 IMPACT ON WATER ENVIRONMENT AND MITIGATION MEASURES

There will not much any negative impact on water environment (Groundwater/Surface water) from the proposed landfill. The liner system will avoid leachate from entering into the groundwater. Monitoring bore wells shall be established around the landfill to keep track of any contamination, which is unlikely because of the liner system and engineering landfill construction. The leachate generated from the landfill shall be collected in a leachate holding tank and it is used back on the landfill for dust suppression.

During operational phase, there is a potential threat for the contamination of ground water due to the generation of leachates particularly during rains when the surface runoff infiltrate down the surface of finished and the operational cells of the landfills. Also the water retained in the cells of the landfills shall drift downwards under gravity and may reach the ground water table. Sewage generated from domestic activities of workers at the site can be potential source of ground water contamination if not managed properly. As per the management plan the ground water quality shall be monitored at regular intervals in the operational phase of the project to check for contamination.

Mitigation Measures

- The leachate will be treated in a Leachate Treatment Plant (LTP) of 500 KLD capacity and treated water will be recycled for utilization in vehicle washing, greenbelt development and floor washing.

- The bottom and side layers of landfill will be constructed with several layers which includes clay layers, HDPE, Geotextile facilitating leachate collection through network which avoids percolation of leachate in to ground water.
- A final cover system at the top of the landfill which enhances surface drainage, infiltrating water and supports surface vegetation shall be provided.
- A surface water drainage line which collects and removes all surface runoff from the landfill site is provided.
- An environmental monitoring system which periodically collects and analyses air, surface water, soil-gas and ground water samples around the landfill site.
- A closure and post-closure plan which lists the steps that must be taken to close and secure a landfill site once the filling operation has been completed and the activities for long-term monitoring, operation and maintenance of the completed landfill.

4.6.2.1 Optimization of cycles of concentration (COC)

The proposed Cycle of Concentration (COC) for the proposed project is four.

As per the water balance diagram (figure no. 2.10), the ultrafiltration backwash drainage, boiler blowdown cooling pool drainage, cooling tower blowdown and part of threated water from LTP will be sent to the reuse pool for reuse in reaction tower flue gas water, roads washing and greening water, slurry preparation and cooling water, and flushing water between discharge rooms.

Most of the recycled water will be consumed, and only about 1.2m3/h of flushing water is sent to the treatment plant for treatment. Among them, the parameters like total suspended solids concentration in the ultrafiltration backwash drainage and the boiler blowdown cooling pool drainage will be about 50mg/L; the total suspended solids concentration in the cooling tower blowdown is about 50mg/L, and the total dissolved solids concentration is about 2200mg/L; The quality of effluent treated by the wastewater treatment station is: BOD5≤10 mg/L, CODCr≤60 mg/L, total dissolved solids≤1000 mg/L.

4.6.3 IMPACT ON AIR ENVIRONMENT AND MITIGATION MEASURES

Prediction of Impacts on the Air Environment

Prediction of impacts from the proposed project on the ambient air quality was carried out using air quality simulation models. The main sources of air pollution are as follows.

5. Area source emissions from Landfill operations
6. Point source emissions from Incinerator, DG set.

The emissions from the DG sets are minimal since they will be operated only during power failures.

4.6.3.1 Atmospheric Dispersion of Stack Emissions

In order to estimate the ground level concentrations due to the emissions from the proposed project, EPA approved American Meteorological Society/ Environmental Protection Agency Regulatory Model - AERMOD 9.9.0 dispersion Model has been used. AERMOD dispersion Model provides option to model emissions from a wide range of sources that are present at a typical industrial source complex. The model considers the sources and receptor in undulated terrain as well as plain terrain and the combination of both. The basis of the model is the straight line steady state Gaussian Plume Equation, with modifications to model simple point source emissions from stacks, emissions from stack that experience the effect of aerodynamic down wash due to nearby buildings, isolated vents, multiple vents, storage piles etc. AERMOD dispersion model with the following options has been used to predict the cumulative ground level concentrations due to the proposed emissions.

Following dispersion parameters are considered for the proposed project for dispersion modelling:

- Predictions have been carried out to estimate concentration values over radial distance of 10 km around the sources
- A combination of cartesian and polar receptor network has been considered
- Emission rates from the sources were considered as constant during the entire period
- The ground level concentrations computed were as is basis without any consideration of decay coefficient
- Calm winds recorded during the study period were also taken into consideration

- 24-hour mean meteorological data extracted from the meteorological data collected during the study period as per guidelines of IMD/CPCB has been used to compute the mean ground level concentrations to study the impact on study area.

Area Sources

Daily waste will be discharged by tipping at the working area on a landfill, within the area demarcated for the cell. Daily/Weekly cover (optional) is primarily used for prevention windblown dust, litter and odours, deterrence to scavengers, birds, reduction of infiltration (during unseasonal rain) and in improving the sites visual appearance. Soil used as daily / weekly cover shall give a pleasing uniform appearance from the site boundary. To achieve this thickness of about 150 mm is usually adequate and shall be adopted.

Point Sources

The point source emissions considered for the proposed project are boiler. The DG set will be used only during power failure for emergency requirements. Hence the impacts from DG set will be felt only during power failure. The inputs used to run the model are stack details and emissions details which are given in Table 4.1

The predicted maximum ground level concentration of PM, SO2 & NOx concentration considering 24 hour mean meteorological data of study season are superimposed on the maximum baseline concentrations obtained during the study period to estimate the post project scenario, which would prevail at the post operational phase. The overall scenario with predicted concentrations over the maximum baseline concentrations is given in Table 4.2 and isopleths are given in the Figure 4.1 to 4.3.

Table 4.1 Stack Emission Details

Details	Boiler	DG Set
Capacity	Grate type Boiler 750 TPD*2 no.	630 KVA
Height of the Stack (m)	60	10
Temp of flue gas (°C)	190	450
Internal Dia. of the stack (m)	2.8	0.3
Velocity of Flue Gas (m/s)	20	16
PM Emissions (g/s)	0.63	0.02
SO_2 Emissions (g/s)	3.19	0.02
NOx Emissions (g/s)	12.17	0.44

Table 4.2 Post Project Scenario (µg/m³)

Particulars	Particulate Matter (PM)	Sulphur Dioxide (SO_2)	Oxides of Nitrogen (NOx)
Baseline Scenario (Max)	354.37	19.99	74.09
Predicted GLC (Max)	0.51	0.65	2.61
Overall Scenario (Worst Case)	354.88	20.64	76.7
NAAQ Standard 2009	**100**	**80**	**80**

Figure- 4.1
Predicted GLCs of PM (µg/m3)

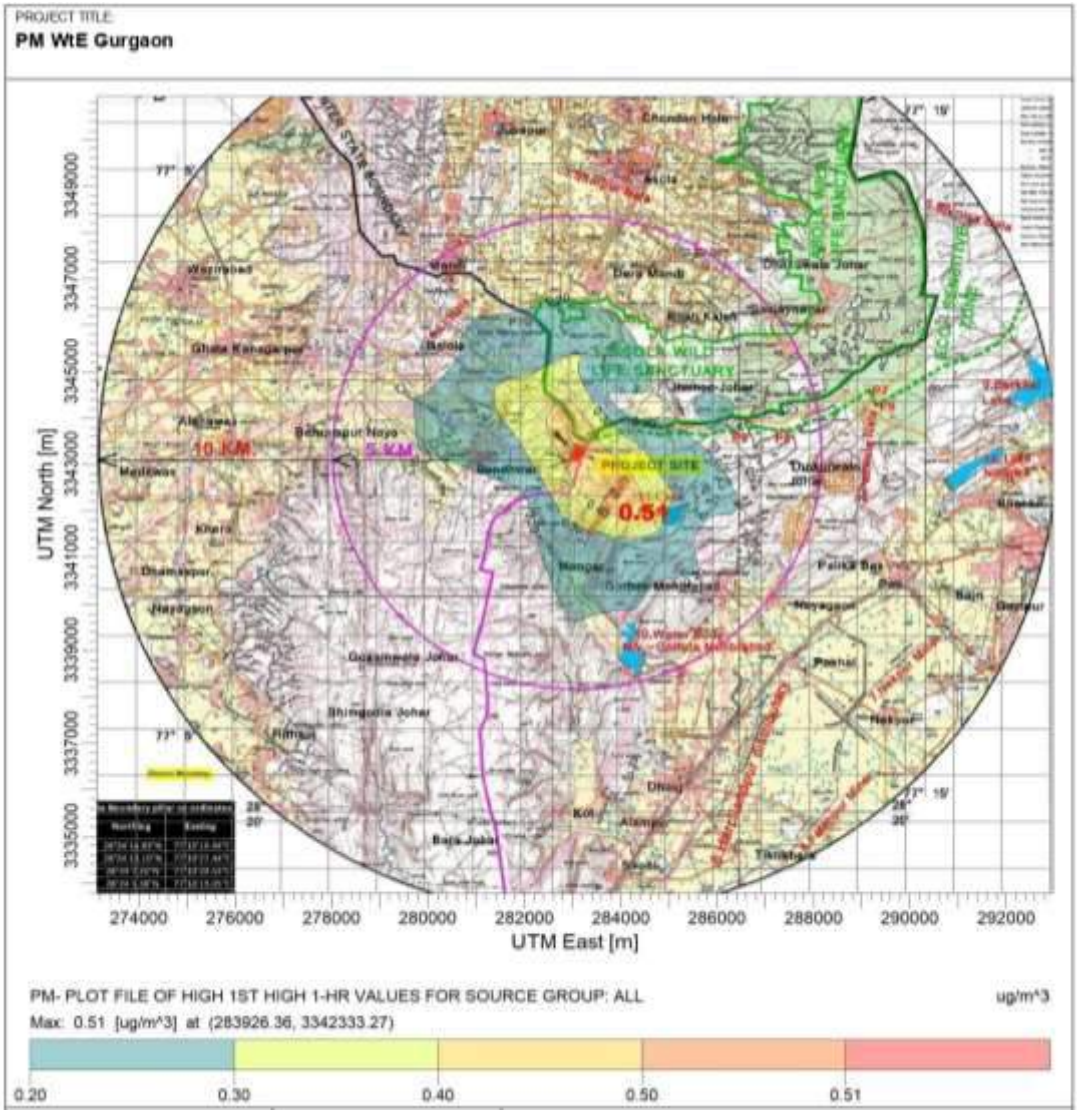


Figure- 4.2
Predicted GLCs of SO2 (µg/m3)

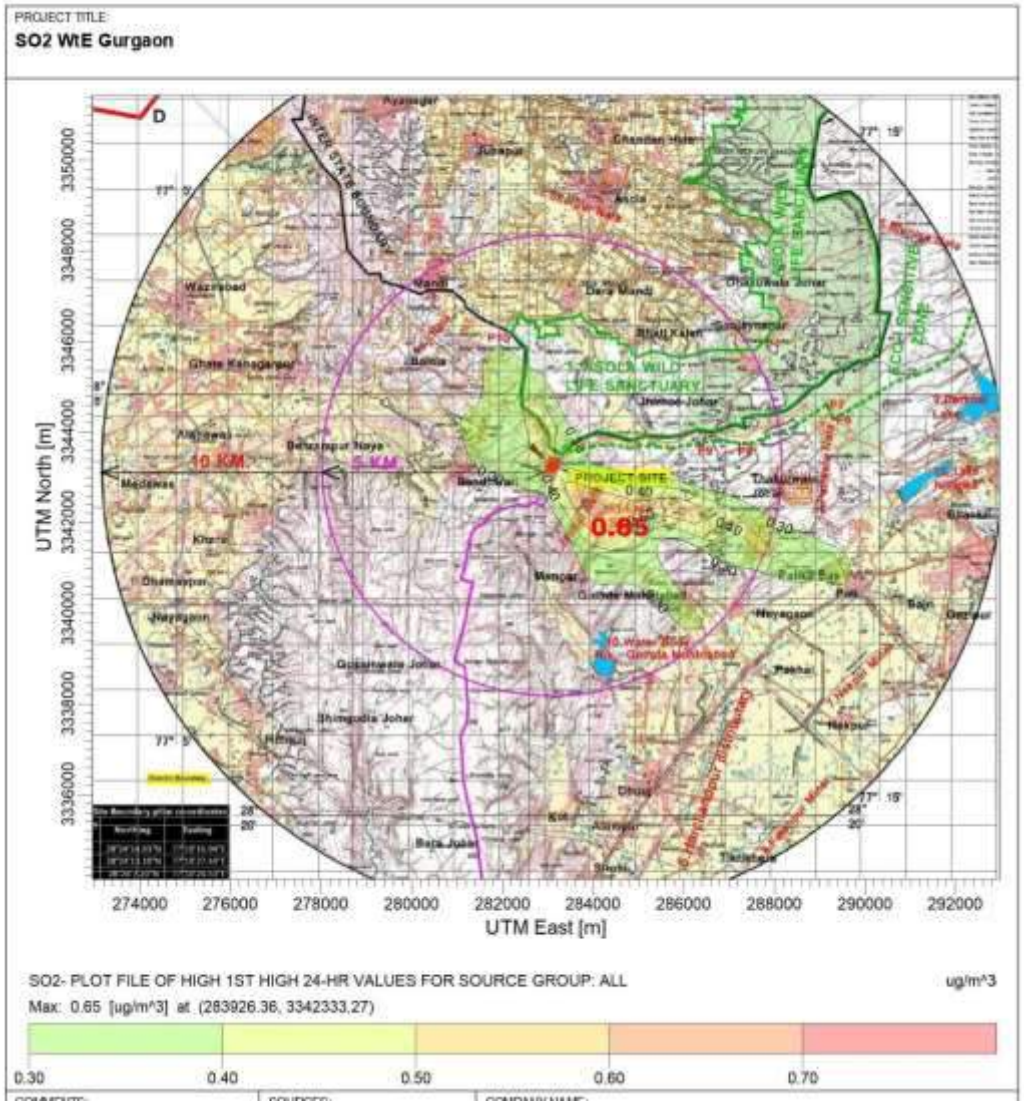
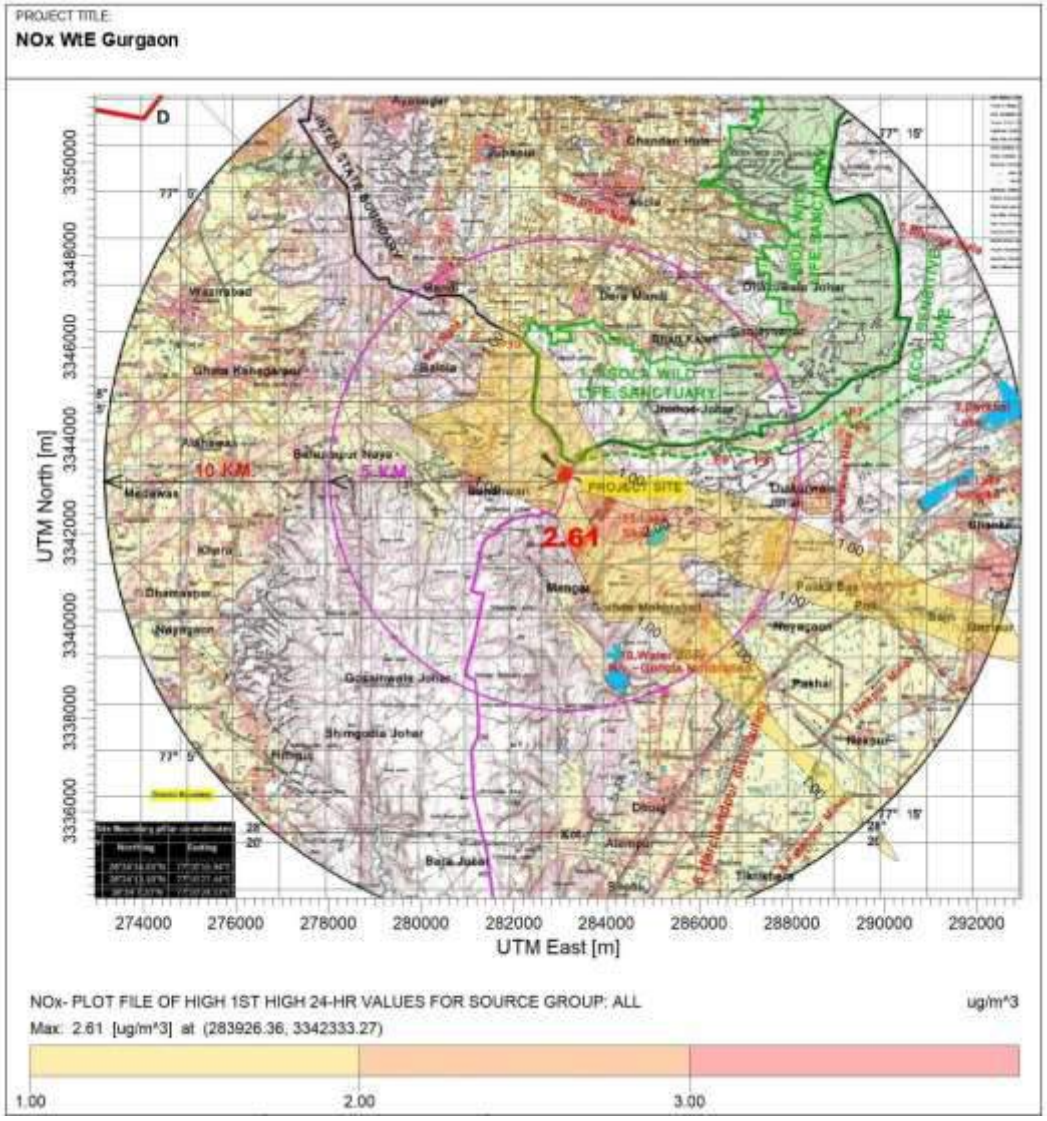


Figure- 4.3
Predicted GLCs of NOx (µg/m3)



Considering operation phase, the sources of fugitive dust are due to movement of garbage laden trucks and tractors to and fro the land fill site. The unloading of garbage trucks and tractors release suspended particulates .Further; the operation of wheel loader during levelling operations (of the dumped solid waste) creates fugitive particulates. Also The fly ash in flue gas is the potential source of fugitive emission. However, the fly ash generated from the incineration plant will be used for utilise for road bed construction, deep pit filling, brick making etc.

The gaseous pollutants referred to above shall be emitted by the trucks and tractors plying for the transportation of daily garbage. This component of the gaseous pollutants shall be small as compared to the quantum generated during construction phase. Methane and CO_2 are two gases expected to be released from the sanitary landfill. As per the current observations the concentration of carbon di oxide and Methane are found for that gas collection system is proposed.

4.6.3.2 Mitigation measures

- The haulage trucks and tractors involved for garbage transportation shall be covered fully with tarpaulins and shall be prevented from spillage of dirt during transit.
- A dense green belt with fast growing floral species as recommended by CPCB with climatological adaptability shall be developed along the periphery of the landfill site.
- The important dust suppression measures proposed will be regular water sprinkling on main haul roads in the project area, this activity will be carried out at least twice a day, if need arises frequency will be increased on windy days, in this way around 50% reduction on the dust contribution from the exposed surface will be achieved.

4.6.3.3 Flue Gas Cleaning System (FGCS):

Flue gas cleaning system (FGCS) refers to a range of processes imposed on untreated combustion gas to limit harmful pollutants such as emissions of dust, acidic gases, heavy metals, and dioxins to levels well below legal emission limits.

This flue gas cleaning requires various utilities like water, steam and chemicals involves removal of following pollutants substance from flue gas.

1. NOx removal
2. Gaseous contaminants removal
3. Removal of very toxic substance dioxin and mercury
4. Particle removal

Removal of above components requires two processes physical and chemical. Generally, the particulate matter is removed by the physical process and other items are removed by chemical reaction or by adsorption at the surface of the activated carbon or fabric filters.

There is a number of equipment that has to cater to the emission and it is not possible by the use of single specific equipment.

Selection of Technology/Combination of equipment's/ technologies proposed to be used to clean the flue gas to achieve the prescribed norms is as tabulated hereunder:

Flue gas constituent	Selected Technology	Description
NOx Control	SNCR System & Maintaining combustion temperature	Reduction of NOx using selective non-catalytic reactions (20% concentration ammonia as reducing agent). Boiler combustion control allows the bed temperature to be limited to 850 ^{0}C, thus formation of the NOx is limited as per the selection of the technology.
Gaseous contaminants removal	Semi Dry Deacidification Tower	Dry adsorption system using hydrated lime to control all fugitive emissions.
Auxiliary system to deacidification	Dry Powder Injection Adsorption	To improve the deacidification efficiency by using dry powder lime
Particle removal	Bag filter	Bag filter are capable of meeting the emission norms, the use of bag filter is to remove the particulate matter (SPM) as per SWM rules 2016.

Flue gas constituent	Selected Technology	Description
Dioxins/furans	Injection adsorption of activated carbon	Dioxins and Furan completely disintegrate into harmless compound at ≥ 850 ^{0}C, if the residence time provided for flue gases in the furnace zone kept more than 2 sec. Reformation of the Dioxins and Furans after leaving the furnace is controlled effectively by rapid quenching of Flue Gases in the downstream of the furnace by providing a large heat exchange area (furnace water walls, bank Tubes, super heaters and economizers) for quick cooling of flue gases. Control is done by means of adsorption on pulverized activated carbon which is injected before the bag house filter chamber in the Reactor. Slaked lime will also be injected into the reactor
Emissions from Stack	Real time Online Continuous Monitoring System	Online continuous monitoring System will be installed for monitoring, controlling & maintaining emissions as per CPCB guidelines.

According to the flue gas parameters of the waste heat boiler outlet, the flue gas purification system of the project adopts the following process:-

f) "SNCR furnace denitration system
g) Semi-dry flue gas deacidification tower
h) Dry powder injection adsorption system
i) Activated carbon injection adsorption system
j) Bag filter

The flue gas purification process system meets the stricter flue gas emission standards of SWM Rule 2016 requirements. The flue gas emission index of this project is shown in the following table no.: 2.10 in terms of dry base, O2 content 11%. Detailed description of proposed FGCS is furnished in Chapter no. 2, section no. 2.7.

Stack Height: The purpose of stack is to expel the cleaned gases from the flue gas treatment system to the atmosphere. The flue gas of each incineration line is treated by the flue gas purification system (FGCS) and discharged into the chimney/stack by the induced draft fan. The height of the chimney/stack will be 60m. The DG Sets for emergency purpose will be provided stack heights as per the CPCB rules.

4.6.3.4 Odour

Odour is one of the main concerns of those staying in close vicinity to the plant. Considering this, the design of the facility would be such that the odour will be contained within the boundaries of the facility. Herbal pesticides and Indigenous Tree & root Aroma Plantation © IECRS (ITRA) Plantation technique - Z shape will be used to deal with the odour problem at the project site. Also proper measures will be taken at plant vicinity as proposed in chapter no.2, section no. 2.9 of this report to reduce and manage this issue.

4.7 IMPACT OF NOISE / VIBRATIONS & MITIGATION MEASURES

Noise and vibration are generated during operation phase due to compactor, transportation vehicles, JCB and operation of Machinery & DG sets.

Mitigation measures

The damage risk criteria for hearing, as enforced by OSHA, USA, stipulate that noise levels up to 90 dB (A) are acceptable for 8-hour exposure per day. In this context, it is to be noted that:

- The noise levels predicted for the human settlements will be below the levels specified by the CPCB for residential areas.
- At places of continuous noise generation, continuous attendance of workers is not required. Hence, the workers will not be exposed to continuously high noise levels.
- The noise level at the critical places is of concern from occupational consideration and adequate protective measures aimed at reducing the effect of noise levels will have to

be taken for these workers. The mitigation measures will include job rotation and provision of earmuffs in high noise areas.

- Plantation will be done in around the project site.

4.8 IMPACT DUE TO HAZARDOUS & NON HAZARDOUS WASTE & MITIGATION MEASURES

The Solid waste generated in operation phase will contain the processing plant residues like Fly ash & Bottom ash and preprocessing plant inerts. Fly ash, Bottom ash, used Bag filters, activated carbons, RO membranes & sludge from LTP as waste will be produced from the proposed waste to energy plant. The proposed waste to energy project of 25 MW is going to generate fly ash and bottom ash to the tune of 4.71 TPH (113.04 TPD) & 17.4 TPH (417.6 TPD) respectively.

Also, Used Oil (Category 5.1) as Hazardous waste will be produced from backup DG Set and other machinery.

Table no.4.3 Details of Non Hazardous & Hazardous Solid Waste Generation from proposed project

Item	Quantity	Remarks
Non - Hazardous waste generation		
Fly ash waste	4.71 t/h	Rated condition (2x750t/d boiler)
Bottom ash waste	17.4 t/h	
Consumption of Activated Carbon	50 Kg/h	2x750t/d boiler
Used RO membrane	Minimum-22 elements/year	
Used Filter Bags	38 no.+ 2	For 2 lines
Sludge	15TPD	From LTP
Hazardous waste generation		
Used oil (category 5.1)	300 L/Y	DG set

Mitigation Measures:

The Ministry of Environment, Forest and Climate Change (MoEF&CC) issued the Fly Ash Notification on 14th September 1999, which has subsequently been amended in 2003, 2009 and 2016. The Fly Ash Notification (1999) mandates the use of fly ash for the purpose

of manufacturing ash-based products such as cement, concrete blocks, bricks, panels or any other material and for construction of roads, embankments, dams or for any other construction activity within a radius of 300 km from thermal power stations (TPPs). Besides, it also mandates use of fly ash in mines backfilling or stowing of mines within a distance of 50 km. Also, as per MoEF&CC's OM vide F. No. 22-13/2019-IA.III dated 28.08.2019 will also be followed for proper utilisation of Fly Ash and its management.

Fly Ash shall be treated & stabilised accordingly to guidelines/requirements & further transported to landfill & also used for brick making etc. Bottom Ash will be collected separately and will be utilized for road bed construction, deep pit filling etc. Used bag filters and sludge is sent to garbage storage and then incinerated with garbage.

Used oil will be utilised in-house for greasing the machineries. The balance if any will be handed over to the authorized hazardous waste recyclers.

4.9 IMPACT ON BIOLOGICAL ENVIRONMENT & MITIGATION MEASURES

The understanding of the proposed project activity and associated construction, operation and management phases of the project, the environmental issues, and anticipated impacts on study area were visualized. The Biodiversity & Ecology study was focused to incorporate some of the biological interventions to further reduce the likely impacts as well as to provide suitable habitats to improve the overall biodiversity attributes evaluated under this study.

Flora & Fauna and Damage to habits

1. During the construction phase, PM10 is expected to be the main pollutant associated with on-site roads (paved and unpaved), stockpiles and material handling site reclamation, biomining of legacy waste and preparation. During these activities, trucks carrying construction materials and soil would also add into other pollutants, viz. carbon monoxide (CO), oxides of nitrogen (NOx) and inhalable particles besides fugitive dust. The scale of impact would be temporary but very adverse, as lots of dust would be produced, which could cause poor visibility and accumulated on the leaves of trees, plants present in the nearby areas of plant

2. During the operational phase (Waste to Energy), the major source of pollution will be boiler stack for which modeling exercise has been performed and worst scenario were presented in above table no 4.2 in this chapter.
3. Potential primary and secondary impacts from the proposed project on the biological environment have been identified and the significant ecological impact is evaluated based on:

- Habitat Quality
- Species affected
- Size/abundance of habits/organisms affected
- Duration of Impacts
- Magnitude of environmental changes

4. The sources of activities responsible for the ecological impacts are surface excavations, construction activity, disturbance and damage, site engineering, restoration, dust, litter, etc. This phase has the potential to have the most direct impact in terms of physical loss and disturbance. The damage to the habitat around the site can also be possible resulting from various aspects of normal construction, such as temporary storage of stripped topsoil and bulk access to working areas and incursion of workers into ecologically sensitive areas. The temporary site drainage may cause the local water resources polluted.

Flora and fauna may be exposed to the high levels of dust during excavations of landscaping and access roads. More general disturbance is likely to result from the noise, dust and movements of vehicles and personnel.

The existing land cover and physiognomy support plant species typical of habitats and having a low plant diversity and simple structure. Due to commonness of the species recorded and small area of habitats for herbs and shrubs to be lost, potential impacts to flora are considered minor. During the construction stage; there will not be any removal of shrubs and herbs as it's an existing IMSWM project site. The proposed peripheral greenbelt will provide a much better habitat for those species than earlier.

Air, noise and visual disturbance may be generated during the site development that can affect the behavior of fauna (especially bird, butterflies and other insects, reptiles and very small mammalian species) of the adjacent habitats. Small mammalian species such as mongoose and palm squirrel were recorded from the site premises. These species will be temporarily affected and may be migrated to nearby areas. However, alternative habitats are available in nearby areas, and disturbance is going to confine to the construction period only. Besides, these activities and the resulting impact on the existing ecology would be suitably compensated and mitigated adopting comprehensive EMP.

Hence; the potential impacts to faunal groups from this source are ranked minor.

Mitigation Measures

Construction Phase

- Restrict the activities as much as possible to the project site and allocate the track roads for construction
- Awareness given to site workers about ecologically sensitive areas.
- No illegal hunting and poaching activities to be allowed in the study area;
- No vegetation to be removed from area outside the project site boundary;
- Minimum levels of noise during construction activities shall be maintained as well as illumination and night operations will be restricted to avoid adverse Impacts on habitat of fauna.
- If wild animals are noticed crossing the core zone, it will not be disturbed at all Labors will not be allowed to discards food, plastic etc., which can attract animals near the Project site.

Operation Phase

- A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary, odour management and provide habitat to small birds and mammals;
- No activities shall be planned in the green buffer other than approach/ service road.
- Employees should be aware about wild animals.
- No illegal hunting and poaching activities to be allowed in the study area

In total, 5 different management action plans were suggested and categories into two management plans and detailed in Table no. 4.4. All the 6 plans recommended were basically different kinds of restoration plans for specific landscape mainly to support specific faunal groups and species. Therefore, these management plans are given different titles, based on the focused biodiversity enhancement, to achieve the project goal.

Table no. 4.4 Suggested Biodiversity Conservation and Management Plan

Types	Action Plan
Selected Impact Mitigations	1. Green Shelter Belt - Air pollution Control
	2. Avenue Plantation
	3. Plantation – waterlogged areas
Threatened Species Conservation	4. Improvement in Food and Nesting Habitat
	5. Elevated earthen / Wooden platforms for the birds
	6. Artificial Nesting Platform

4.9.1 Specific Conservation Plan of Schedule I & Schedule II

Table 4.5: List of Schedule I fauna observed in the study area

S. No	Common Name	Scientific Name	Schedule as per WPA 1972
1	Leopard	*Panthera pardus*	Schedule I
2	Jackal	*Canisaureus*	Schedule II
3	Jungle Cat	*Felischaus*	Schedule II
4	Common Mongoose	*Herpestes edwardsi*	Schedule II
5	Langoor	*Presbytis entellus*	Schedule II
6	Common Monkey	*macacamulatta*	Schedule II
7	Civet Cats	*Viverridae Family*	Sch II (Part I)
8	Indian Peafowl	*Pavo cristatus*	Schedule I
9	Black Partridge	*Melanoperdix niger*	Schedule I
10	Indian Cobra	*Naja Naja*	Schedule II
11	Russell's Viper	*Vipera russelii*	Schedule II
12	Common Indian Krait	*Bungarus caeruleus*	Schedule II
13	Indian Monitor Lizard	*Varanus griseus*	Schedule I
14	Common Rat Snake	*ptyasmucosus*	Schedule II
15	Python	*Genus Python*	Schedule I

A detailed site specific conservation plan & wildlife management plan was prepared with understanding of the biodiversity values of the project study area at different study habitats,

species group, specific species (threatened species) levels and existing environmental scenario and approved by Principal Chief Conservator of Forest & Chief Wildlife Warden, Haryana vide letter no. 992 dated: 09/07/19. Detailed specific conservation plan for each species mention in above table no. 4.5 and 4.6 with consultation and approved by Principal Chief Conservator of Forest & Chief Wildlife Warden, Haryana vide letter no. 992 dated: 09/07/19 has been well furnished in annexure – XIV.

Table 4.6: SPECIES WISE CONSERVATION PLAN

SN	Habitat development of species	Planned by project proponent	Natural in buffer zone
1	Langur	Perma culture based Plantation	Within 10.00 Km
2	Borrowing animals	Dumps, backfilled areas & vegetation	Within 10.00 Km
3	Grazing animals	Identification of sites in consultation with forest department	Cultivated /grazing land
4	Barren lands	Identification of sites in consultation with forest department	Waste land
5	Birds	By hanging artificial nests and feeding plates	Tall tress /houses

Steps for Implementation Of Conservation Plan

- The Afforestation & plantation plan will improve the habitat for fauna of the area.
- Wildlife will be protected against illicit killing, check gate, fencing will be provided to prevent unauthorized entry.
- The survey will be done to mark wild life game trials so as to minimize the disturbances on these routes. Artificial small water tanks will be created in the area in consultation with gram panchayat which will provide sufficient drinking water up to summer for the fauna of the region.
- The plantation at earmarked places will provide suitable habitat for monkeys.
- Increased feeding ground of the hare, rodents and monkeys will improve the food chain.
- Boundary wall will be maintained & developed as per standard norms in order to restrict the scattering of waste due to wind and oozing out of leachate from boundary wall .

4.9.1 Indicators for Biodiversity Improvements For Each Above Impact And Its Mitigation Measure Plan: For General Local Flora And Fauna

Inputs were suggested in the plan to protect the migratory birds / Schedule I & II observed in the study area. Though it is just a habitat improvement plan for different bird species, but we cannot protect them in isolation until and unless all the components of their habitats are protected. Hence utmost safeguards have been taken to protect all the component of the habitat of different faunal groups.

Table No. 4.7 Indicators For Biodiversity Improvements For Each Above Impact And Its Mitigation Measure Plan

S. No.	Suggested input	Impact forecasted
1.	Protection of movement trails.	Animals will easily reach to their breeding, living and feeding sites.
2.	Protection of roost trees	Langurs, flying foxes raptors, birds get benefited. Their stay can be ensured in the area.
3.	Protection of feed trees of langurs	Stay of langurs can be ensured in the area. This will support panther directly.
4.	Protection of caves and concaves	This will facilitate breeding of carnivorous animals like panther, civets, hyena, vultures etc.
5.	Protection of Bee trees and nectar providing species	This will support population of Honey Buzzard and other insectivorous birds.
6.	Protection of termiteria and ant holes.	This will support insect eating species including pangolins.
7.	protection of water sources	This will ensure drinking and bathing water availability for all animals. It will protect fish fauna of the area. Fish are food of many species including Osprey. Availability of water will check strey movement of the animals.
8.	Protection of vegetation, Planting activity, soil, and water conservation activities	Ensure habitat quality.
9.	Protection of dry trees, hallow trees	Ensure protection of raptors civets, birds.
10.	Placement of artificial nest boxes	Ensure maintenance of hole nesters.
11.	Awareness activities	Making the people pro wildlife.

Control and tracking of conservation plan could be checked by following criteria:

Table 4.8 – Measures to Control and tracking of conservation plan

S. No.	Criteria	Inference
1.	Active nests of birds are visible in the area	+ve sign for birds life.
2.	Young's of different species are available	+ve sign. Breeding is going on. Population is increasing.
3.	Pugmarks are present on trials, near water bodies	+ve sign. Animals are present and utilizing the habitat.
4.	Young plants of different species of different age group are present	+ve sign. Regeneration of forest species is going on
5.	Bees are present on cliffs, flowers and at water sources. No. of hives are constant or increasing.	+ve sign Habitat is suitable for hives.
6.	Roosts of langurs are still in use of langurs	+ve sign. Habitat is suitable for langurs. Panther will stay in the area.
7.	Apex animals of food chains are present.	+ve sign ecosystem is functioning well.
8.	Fishes are present in water. No. of fishes per cum is constant or increasing	+ve sign. Quality of water is good.
9.	No. of termiteria is constant or increasing.	+ve sign.
10.	No. of moist, wet sites, is constant or increasing.	+ve sign. Hydrology of area is OK.

4.9.2 CONSERVATION PROGRAM FOR BIRDS

It is proposed to provide artificial nests for promotion of breeding in the birds. The water pots and feeding plates will be hanged on the roof of the houses and also on the branches of the trees in the afforested area. It is also proposed to provide artificial nest in the nearby houses in the villages. Destruction of the nests of the birds by unsocial elements needs to be looked into. People will be made aware for not flying the kites during various occasions, because strings of the drifted kites may handicapped or strangulate the birds.

4.9.3 CONSERVATION OF ECOLOGICAL, BIODIVERSITY AND WILDLIFE

Conservation is 'the maintenance of essential ecological processes and life-support systems, the preservation of genetic diversity, and the sustainable utilization of species & ecosystems'. Conservation through the involvement of local communities, found an effective measure to makes everyone as a responsible part of ecosystem. Generally, all the conservation efforts are done to save charismatic & large animals.

4.9.4 COMMUNITY PARTICIPATION AND CONSERVATION AWARENESS

Conservation of schedule–I animals in human dominated landscape is directly depended on the involvement of locals, at every stage of protection. We will approach to village level community groups and discussions were held to involve them.

4.10 IMPACT ON SOCIO ECONOMIC ENVIRONMENT & MITIGATION MEASURE

The impacts on socio-economics may occur due to noise, dust and odor issues which may further affect community health and safety.

Anticipated Impacts

Aesthetics

The landfill will be capped and the topmost layer will be landscaped thereby improving the aesthetics of the area.

Impact on Community Health

The local residents in the vicinity of the project site might be affected by increased noise levels, odour, air emissions and traffic. Noise generation during operation phase due to operation of various equipment's, turning of composting pads, movement of trucks for waste loading and unloading which has the potential to affect the health of the people in the vicinity.

Odour Nuisance:

Odour is one of the main concerns of the locals in vicinity to the proposed project. However, the impacts due to odour nuisance have been envisaged to be low as the designing of the facility has been planned in such a manner that the odour will be contained within the boundaries of the facility. Therefore, there is little possibility of odour.

Increased Traffic:

Increased traffic levels can lead to localized congestion and disruptions in traffic movements affecting the community.

Economic Benefits to Local Municipality:

Development of the facility will create more jobs in the area and also present the opportunity to provide improved products or services to people in the area. During the operation phase, one of the project activities would comprise of manual segregation of waste. The locals inhabiting or rag pickers, who have been performing the task of informal waste collection, can be employed for this specific activity during the operational phase. There will be fixed source

of income on monthly, weekly or daily basis to the rag pickers of the area, who otherwise depend upon the collection of recyclables from various dump sites across the city. Therefore, the positive impacts on rag pickers due to sustenance of livelihood and improvement in living conditions are anticipated.

Mitigation Measures

- Labor/workers will be provided with necessary facilities like clean drinking water, adequate toilet facilities, electricity and dust bin for solid waste disposal.
- Laborers will be educated and aware to maintain cleanliness and hygienic condition.
- Safety measures will be provided like PPEs, guarding of dangerous machine parts, maintenance of equipments as hoists and lifts etc.,
- Adequate provision of different types of fire extinguishers will be made. All applicable rules and regulations pertaining to workplace health and welfare of workers will be adhered to.

4.11 IMPACT ON OCCUPATIONAL HEALTH & SAFETY

Healthy and safe working conditions are among the first expectations for sustainability, i.e. Occupational injuries and ill-health have huge social and economic implications for individuals, their families and their communities. They also have an adverse impact on the economy of the society as a whole.

- Injury due improper handling, operation and execution.
- Occupational hazards like high noise, electric shocks etc.
- Trip and fall, inadequate fall safe arrangements.
- Diseases from unhygienic surrounding.
- Exposure to hazardous substances etc.
- Workers at times are not accustomed to use of Personal Protection Equipment, their attitude to avoid PPE may result in accident/hazard

Mitigation measures

- Workers will be provided with required PPEs to be used at site;
- The necessary safety measures will be taken up before and during the construction.

- Good Waste Handling practices will be implemented which will greatly reduce foul smell and reduce impact from odours.

Details of Infrastructural Facilities for Worker

- Water for drinking & other purpose will be arranged.
- All the safety equipment's such as helmets, safety shoes, goggles, dust masks etc.
- A well-equipped first aid facilities,
- Periodic medical health check-ups,
- Rest shelter, washrooms etc. will provided near the working blocks.

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CHAPTER-V
ANALYSIS OF ALTERNATIVES

Municipal Corporation Gurugram (MCG) MSW Management is proposed to establish an Integrated Solid Waste Management project which will be providing facilities like RDF, Waste to Energy plant, Composting & Landfill facility.

5.1 SITE ALTERNATIVES

Alternate sites have been examined and the existing MSW dump site at Bandhwari was found most appropriate for the proposed project as all existing and upcoming waste could be managed as RDF and used as fuel for WTE to reduce the MSW load & increase the life of SLF & decrease pollution. Also reduce transportation & cost of project.

The proposed project is expansion of waste to energy plant from 15 MW to 25 MW in same selected & existing IMSWM facility at Bandwari village, Gurugram as it has sufficient land and raw material to make expansion also reduces spread of contamination due to MSW & legacy waste. Hence, the proposed site is proves to be the best location considering both the environmental and economic factors for this expansion

Also, as per the revised action plan submitted to Hon'ble NGT on 26th February 2020 against a PIL vides M.A. No.1310 of 2017 in OA No. 514 of 2015, the reclamation of site from legacy/dumped waste is upmost important for restoring environmental conditions and reducing legacy waste quantity. Therefore continuous biomining & reclamation activies are been performed using advance machineries like 9 trommels, DTROs etc for processing of legacy waste and treatment of leachate at the site.

5.2 SITE SELECTION CRITERIA AS PER SWM RULES 2016

- The department in the business allocation of land assignment shall provide suitable site for setting up of the solid waste processing and treatment facilities and notify such sites.
- The sanitary landfill site shall be planned, designed and developed with proper documentation of construction plan as well as a closure planning in a phased manner. In case a new landfill facility is being established adjoining an existing landfill site, the closure plan of existing landfill should form a part of the proposal of such new landfill.

- The landfill sites shall be selected to make use of nearby wastes processing facilities. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.
- Landfill sites shall be set up as per the guidelines of the Ministry of Urban Development, Government of India and Central Pollution Control Board.
- The existing landfill sites which are in use for more than five years shall be improved in accordance with the specifications given in this schedule.
- The landfill site shall be large enough to last for at least 20 years and shall develop 'landfill cells' in a phased manner to avoid water logging and misuse. The landfill site shall be 100 meter away from river, 200 meter from a pond, 200 meter from highways, habitations, public parks and water supply wells and 20 km away from airports or airbase. However in a special case, landfill site may be set up within a distance of 10 and 20 km away from the airport/airbase after obtaining no objection certificate from the civil aviation authority/ air force as the case may be. The landfill site shall not be permitted within the flood plains as recorded for the last 100 years, zone of coastal regulation, wetland, critical habitat areas, sensitive or eco-fragile areas.
- The sites for landfill and processing and disposal of solid waste shall be incorporated in the Town Planning Department's land-use plans.
- A buffer zone of no development shall be maintained around solid waste processing and disposal facility, exceeding five tonnes per day of installed capacity. This will be maintained within the total area of the solid waste processing and disposal facility. The buffer zone shall be prescribed on case to case basis by the local body in consultation with concerned State Pollution Control Board.
- The bio-medical waste shall be disposed of in accordance with the Bio-medical Waste Management Rules, 2016, as amended from time to time. The hazardous waste shall be managed in accordance with the Hazardous and Other Wastes (Management and Tran's boundary Movement) Rules, 2016, as amended from time to time. The E-waste shall be managed in accordance with the E-Waste (Management) Rules, 2016 as amended from time to time.

- Temporary storage facility for solid waste shall be established in each landfill site to accommodate the waste in case of non- operation of waste processing and during emergency or natural calamities.

TABLE 5.1 SITE SELECTION CRITERIA OF THE PROPOSED SITE

S. No.	Criteria	Recommendation	Description of the Site
1)	Lake/Pond	200 m away from the Lake/Pond	There is no any water bodies exist within 200 m from project site.
2)	River/Streams	100 m away from the river/stream	No perennial stream is located within 10 Km of the site.
3)	Flood Plain	No land fill shall be constructed within a 100 year flood plain	None
4)	Highway	Away from 200 m NHAI/State	Gurugram Faridabad road is located at a distance of 30 meter in N direction and NH – 236 is located at a distance of 13.39 km. NW direction.
5)	Public Parks	300 m away from public parks	No parks within 300 m.
6)	Wet Lands	No landfill within wetlands.	There is no wet land exist in study area.
7)	Habitation	200 m away from the notified habitation area.	No habitation observed within 200 m from the site,
8)	Critical Habitat Area	No landfill within the Critical habitat area. It is defined as the area in which 1 or more endangered species live.	No critical habitat exist in study area,
9)	Airports	No landfill within 20 Km	Indira Gandhi International Airport at 18.10 km in NNW Direction. (NOC is attached as Annexure - XII)
10)	Water Supply Schemes/Wells	Minimum 200 m Away	There are no schemes/wells in the area.
11)	Coastal Regulation Zone (CRZ)	Should not be sited	Not applicable

5.3 ASSESSMENT OF ALTERNATIVE TECHNOLOGIES

Considering India's diversity in-respect of cultural, socio-political, geographical, meteorological and economical aspects; it is unlikely that a single model for MSW management is acceptable for application across the country. While the location specific considerations largely influence the choice of applicable technology, there are generic factors which are more or less in common. The MSW consists of biodegradable and non-biodegradable waste. Non-biodegradable portion is mostly occupied by inert material but also include paper, plastics, glass etc., which have either recycling potential.

Therefore, an integrated solution include, proper segregation of the MSW at the source, as promoted in few pockets i.e. either at the source (preferable) or at the transfer stations and processing centre, the organic portion can be sent for composting for use as a soil conditioner/bio fertilizer and the inert after recovery of valued portion (plastic, glass, paper etc.) can be sent for land filling. However, the combustible fraction of municipal solid waste produced from pre-processing of municipal solid waste will be utilised for energy generation through waste to energy plant.

There are also well controlled direct incineration facilities available in developed countries, where the heat is recovered in the form of hot water networking, steam supply to the nearby industries etc. As such, when the composting opportunity is limited, one can explore bio-methanation plants, having least power consumption and the degradable portion could be converted into methane, which can then be converted into energy.

Integrated Municipal Solid Waste Management (IMSWM) proposes a waste management hierarchy with the aim to reduce the amount of waste being disposed, while maximizing resource conservation and resource efficiency. The ISWM hierarchy ranks waste management operations according to their environmental, economic and energy impacts.

FIGURE: 5.1 Municipal solid waste management hierarchy

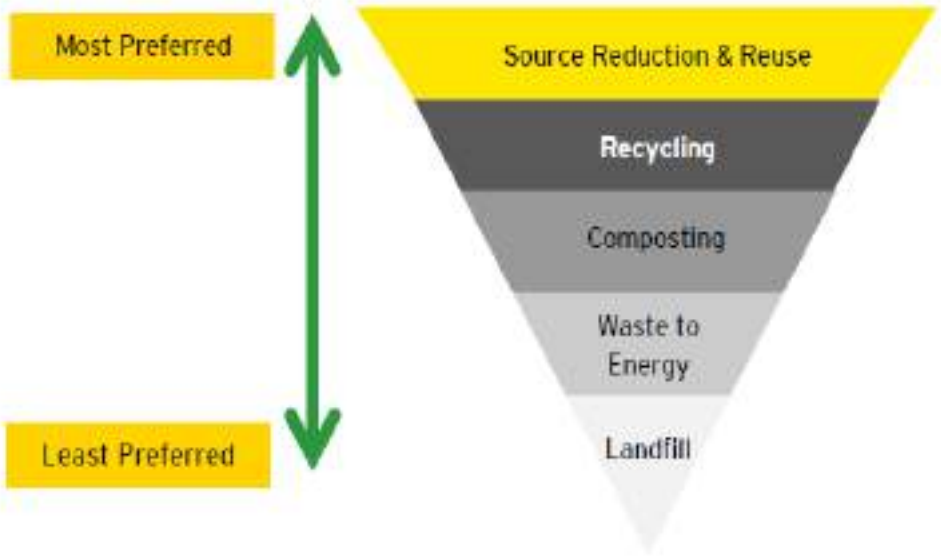
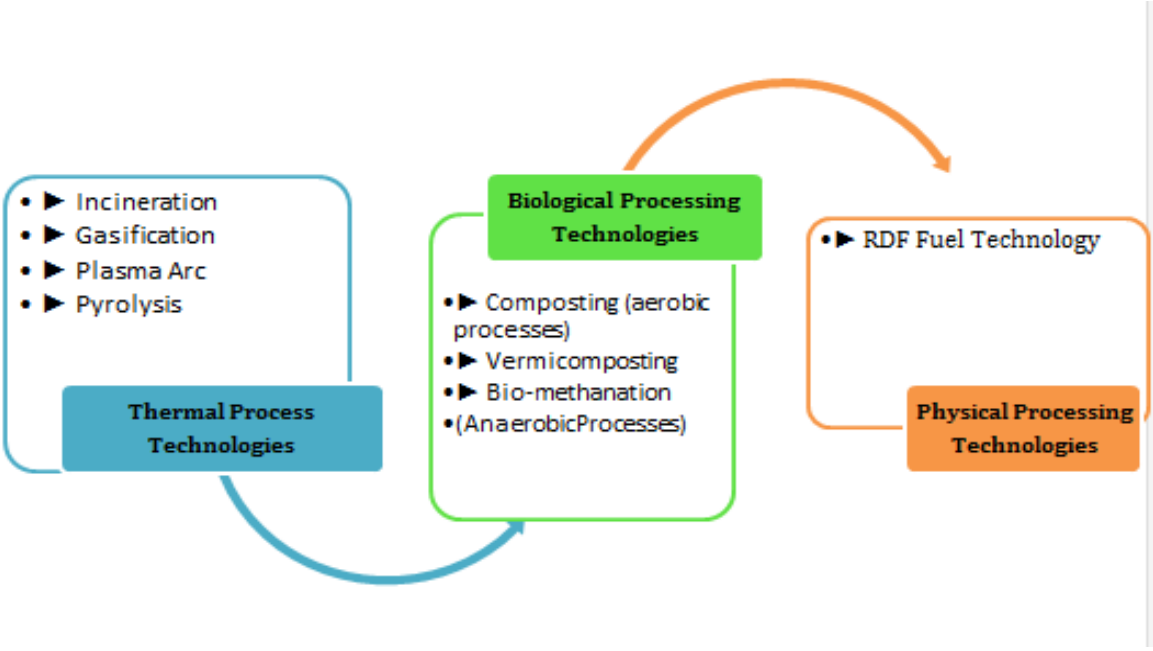


FIGURE: 5.2 MSW TREATMENT TECHNOLOGIES



The detailed evaluation of various waste treatment options as listed below were carried out before selection of treatment technologies for the proposed facility. The various treatment options available were as follows

Summary of MSW processing technologies

Technologies	Pros	Cons

Bio-methanation	It is a process of biochemical conversion or anaerobic digestion wherein municipal solid wastes (food wastes free of plastics and ash) with a large proportion of organic matter is subjected to anaerobic decomposition thereby producing a gaseous mixture of Methane and Carbon di-oxide (CH4 and CO2) known as biogas under favourable conditions. This process is quite stable and gives a good performance at detention time of 25 days.	✓ Treatment at source ✓ Gas/ power generation	✓ Only applicable to organic fraction of MSW
Incineration	Incineration is the process wherein the waste is burned at high temperature. This involves the combustion of processed waste to generate heat which is supplied to a boiler coupled with a steam turbine for electricity generation. The thermal conversion efficiency varies from 80-90% and electricity conversion efficiency is around 14%. Carbon dioxide, water vapour, ash and non-combustible materials will be the end products. However, it is suitable for wastes with high calorific value, low moisture content and is associated with risks such as air pollution.	✓Reduction in volume of waste going to landfill ✓Production of energy which could be used for various purposes ✓Reduction in toxicity of waste and pathogens.	✓Release of harmful emissions in the air. ✓Treatment of the by-products is imperative ✓Skilled operators ✓NIMBY syndrome
Plasma Arc Technology	The system basically uses a Plasma Reactor which houses one or more		

	Plasma Arc Torches which generate, by application of high voltage between two electrodes, a high voltage discharge and consequently an extremely high temperature environment (between 5000-14,000oC) approximating the temperature of the Sun. This hot plasma zone dissociates the molecules in any organic material into the individual elemental atoms while all the inorganic materials are simultaneously melted into a molten lava. The waste material is directly loaded into vacuum in a holding tank, preheated and fed to a furnace where the volatile matter is gasified and fed directly into the plasma arc generator where it is pre-heated electrically and then passed through the plasma arc dissociating it into elemental stages. The gas output after scrubbing comprise mainly of CO and H_2. The liquefied produce is mainly methanol.		
Composting	Aerobic composting is the process of degradation of biodegradable waste matter into simple organic compound by certain micro-organisms in the presence of air. It requires adequate supply of air,	✓ Relatively cost effective	✓ Discharge of leachate and phenols leading to water contamination ✓ Possible

	moisture (50% to 60% optimum), Temperature (50- to 60 degree C, 5 to 7 days for pathogens to get killed), C/N Ratio (between 20–40). Aerobic conversion process is preferable as compared to anaerobic conversion process since it is fast, exothermic and free from odour. Aerobic process also helps to eliminate pathogenic organisms, weed seeds, larva etc. as a result of high temperature developed during the process. The turning of waste is done after approximately 5-7 days to ensure adequate oxygen.		odour ✓ NIMBY syndrome
Vermicomposting	Vermicomposting involves the stabilisation of organic solid waste through earthworm consumption which converts the material into worm castings. It is the result of combined activity of microorganisms and earthworms. The worm species that are commonly considered are Pheretima sp., Eisenia sp.and Perionyx excavatus sp. These worms are known to survive in the moisture range of 20-80% and the temperature range of 20-40oC. The worms do not survive in pure organic substrates containing more that 40% fermentable organic		

	substances. Hence fresh waste is commonly mixed with partially or fully stabilised waste before it is subjected to vermicomposting. The worms are also known to be adversely affected by high concentrations of heavy metals.		
Landfilling	Landfill allows active landfill management based on the understanding of biological, chemical and physical processes involved. It focuses on enhancing the degradation processes to stabilize the waste and aims to bring forward the inert state of a landfill in a relatively short time. It basically utilises a landfill as a bioreactor to treat and stabilize the waste rather than merely as a burial ground. Landfill enhances methane production by accelerating solid waste degradation. The landfill operates with the leachate recirculation technique while the conventional landfill treats leachate offsite for disposal.	✓ Relatively cost effective ✓ Comparatively fast process ✓ Comparatively less environment pollution ✓ Long term sustainable solution for waste management	✓ Discharge of Leachate ✓ Emission of gases due to landfill operations. ✓ Large Area requirement

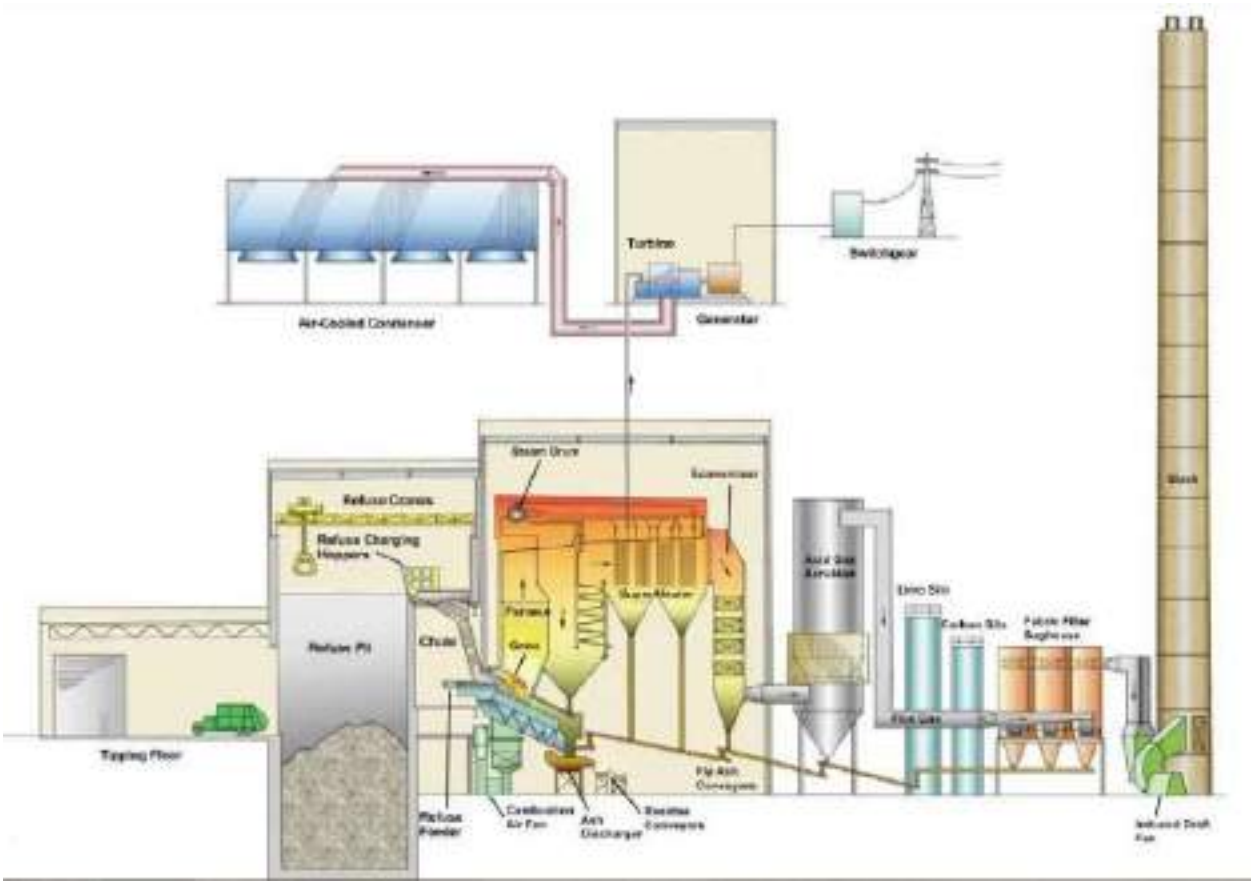
5.4 ALTERNATIVE TO FUELS

Normally, a thermal power plant utilizes coal/natural gas as fuel for power generation.

However, In the proposed project the process of direct burning of wastes in the presence of excess air (oxygen) at temperatures of about 950° C and above, liberating heat energy, inert gases and ash. Net waste to energy yield depends upon the following factors:

- Density and composition of the waste (Calorific value)
- Relative percentage of moisture content and inert material
- Ignition temperature
- Size and shape of constituent
- Design of combustion system

FIGURE: 5.3: 3D MODEL OF GRATE TECHNOLOGIES FOR PROPOSED WTE PLANT



WTE plant designed to intake RDF up to 1500 TPD (750 TPD each) having a calorific value range from 1100 to 2200 kcal/kg. 1500 TPD of RDF out of 2100 TPD of municipal waste is

the agreed quantity by municipality for Gurugram- Faridabad Cluster as per concession agreement for the proposed expansion of project to generate 25 MW of electricity.

5.5 CONCLUSION

Gurgaon & Faridabad cities produces huge quantity of waste i.e. 2100 TPD of municipal waste. MCG & awarded Concessionaire i.e M/s. Ecogreen Energy Gurgaon Faridabad Prt Ltd. have selected incineration with Grate type technology RDF based as fuel for electricity generation i.e. Waste to Energy plant with combination of Landfill, Composting and RDF for sustainable and scientific treatment, management, and disposal of large quantity of municipal waste this big cities. Also, the selected technology will fasten and support the process of biomining & reclamation in reducing the legacy waste quantity soon as possible as per NGT orders. WTE power plant technology is the best suited wherein RDF is incinerated scientifically to produce power, there are no harmful emissions to the environment and the plant residues are just 20% of the original waste volume including inerts; thereby considerably reducing landfill area. This is the most successful and widely used technology world over for Waste to Energy Power plants.

CHAPTER – VI

ENVIRONMENTAL MONITORING PROGRAMME

6.1 MONITORING SCHEDULE AND PARAMETERS

An environmental monitoring plan provides a delivery mechanism to address the adverse environmental impacts of a project during its execution, to enhance project benefits, and to introduce standards of good practice to be adopted for all project works. An environmental monitoring program is important as it provides useful information and helps to:-

- Assist in detecting the development of any unwanted environmental situation, and thus, provides opportunities for adopting appropriate control measures.
- Define the responsibilities of the project proponents, contractors and environmental monitors and provides means of effectively communicating environmental issues among them.
- Define monitoring mechanism and identify monitoring parameters.
- Evaluate the performance and effectiveness of mitigation measures proposed in the Environment Management Plan (EMP) and suggest improvements in management plan, if required.
- Identify training requirement at various levels.

An environmental monitoring plan is suggested to monitor environmental parameters during designing phase, construction phase and operation phase of the project. The Monitoring plan is given in Table 6.1.

6.2 SCOPE OF ENVIRONMENTAL MONITORING PROGRAM

The main objective of environmental monitoring program is aimed such that there is not much of time lack between commencements of damage to environment mitigation measures to various environmental parameters that are being affected.

The Environmental Monitoring Program involves the following-

- Planning a survey and sampling program for systematic data/information collection.
- Conducting survey and sampling program.
- Analysis of samples and data/information collected, and interpretation of data and information.

- Preparation of reports for submitting to management and statutory authorities.
- Environmental monitoring is carried throughout project operation to detect changes in the key environmental quality parameters, which can be attributed to the project.
- The results of the monitoring program used to evaluate the following:-
    a. Extent and severity of the environmental impacts against the predicted impacts.
    b. Performance of the environmental protection measures or compliance with pertinent rules and regulations.
    c. Trends in impacts and overall effectiveness of the project Environment Management Plan (EMP).

Environmental Monitoring Program has been prepared for the proposed project for assessing the efficiency of implementation of Environment Management Plan and to take corrective measures in case of any degradation in the surrounding environment.

6.2.1. Air Environment

For the proposed project, the air emissions are from windrow process, waste to energy plant, DG sets and vehicular movement.

Flue gases emitted from the waste to energy plant will be directly treated in Flue Gas Cleaning System (FGCS) which consist of SNCR denitration system, bag filters etc as per the prescribed norms/standards of SPCB/ CPCB/SWM Rules 2016 before its release into the environment through stack.

DG set is proposed as standby to use during power failure for emergency needs using diesel as fuel and hence are not expected to contribute emissions to the environment on regular basis. Ambient air quality in and around the project site (nearby villages) will be monitored for important parameters.

6.2.2. Noise Environment

Monitoring of the noise levels and exposures is essential to assess the Environmental.

Management Plan implemented to reduce noise levels. A good quality integrated sound level meter and noise exposure meter may be procured for the same. Audiometric tests will be

conducted periodically for the employees working close to the noise sources. Noise levels will be monitored within the project site on regular intervals.

6.2.3. Water Environment

Leachate, domestic sewage, water from piezometers, nearby bore wells, nearby surface water will be analysed regularly for the parameters given below as per SWM rules 2016 and CPCB guidelines. They are as follows:

- pH & EC
- Suspended Solids
- Dissolved Solids
- Oil and Grease
- Chloride
- Sulphide
- COD and BOD
- Nitrates
- Phosphates
- Fecal coliform
- Total Coliform

6.2.4. Land Environment

The soil in the neighbouring areas will be analysed for the relevant parameters. The average canopy height of the greenbelt, number and types of plant species will be monitored. Air and noise pollution attenuation achieved by the greenbelt will also be evaluated. It would be ensured that trained and qualified staff supervises the monitoring of ambient air, stack gases, effluents, noise etc. to see that prescribed standards laid down are obtained.

6.3. SURVEILLANCE AND MONITORING PLAN

Monitoring of the municipal solid waste operations i.e. the physical environment and the Public health in the vicinity of the Integrated Municipal Solid Waste Processing and disposal facility is an integral part to design, construction and operation of the facility. The proposed monitoring program for the proposed project has three interrelated objectives.

- To check implementation and management of the various aspects required for Impact mitigation.
- To check how effective are the measures for mitigation and control of pollution.
- In case of non - compliance further measures for rectification.

All monitoring strategies and program have reasons and justifications which are often designed to establish the current status of an environment or to establish trends in Environmental parameters. In all cases the results of monitoring will be reviewed, analysed statistically and submitted to concerned authorities. The design of a monitoring program must therefore have regard to the final use of the data before monitoring starts.

The monitoring program will have three phases

a. Construction phase
b. Monitoring phase
c. Post monitoring phase

6.3.1. Construction Phase

The major construction activities involved in setting up the unit are construction of sheds for treatment units, stores, administrative blocks, canteen etc. major components in the industry are landfill, Power plant, diesel generator, other civil, mechanical and electrical equipment. The construction activities require clearing of vegetation, mobilization of construction material and equipment. The construction activities are expected to last for few months.

During construction phase of landfill at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers, leachate collection system, storm water management system, gas vent systems, etc. The generic environmental measures that need to be undertaken during project construction stage are given in the following Table 6.1.

TABLE -6.1 ENVIRONMENTAL MEASURES DURING CONSTRUCTION PHASE

S.No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring & Locations

1)	Air Emissions	• Ambient air quality within the premises & adjacent villages of the proposed unit to be monitored. • Maintenance of DG set emissions to meet stipulated standards.	PM_{10}, $PM_{2.5}$, SO_2, NO_x, and CO Gaseous emissions (SO_2, HC, CO, NO_x)	Monitoring once in season except for monsoon (once a year) 24 hour reading as per NAAQS, 2009/CPCB guidelines in minimum 4 locations (one location at site & three in adjacent villages)
		Compaction of soil during various construction activities	PM_{10}, $PM_{2.5}$, SO_2, NO_x, and CO & Construction logs	
		• Vehicle trips to be minimized to the extent possible. • All equipment's are operated within specified design Parameters.	Vehicle logs Random checks of equipment logs/ manuals	Periodic during site clearance & construction activities.
		Any dry, dusty materials stored in sealed containers or prevented from Blowing.	Stockpiles or open containers of dusty Materials.	
2)	Noise	List of all noise generating machinery onsite along with age to be prepared.	• Noise intensity in dB(A) Day & Night, Leq, Lmin, Lmax, L10, L90, L50 • Noise reading • Working hour records • Maintenance & Random checks of vehicles equipment records logs/manuals • Instant Noise recording	Monitoring once in Season 24 hour reading as per standards in minimum 3 locations within 500m with respect to site. Regular during construction activities,
		Night working is to be Minimized.		
		Generation of vehicular activities noise		
		Implement good working practices (equipment selection and siting) to minimize noise and also reduce its impacts on human health (ear muffs, safe Distances and enclosures).		
		Acoustic mufflers/enclosures to be provided in large engines		
		Noise to be monitored in ambient air within the plant premises.		
		The noise level will not		

		exceed the permissible limit both during day and night times		
3)	Soil Erosion	Minimize area extent of site clearance, by staying within the defined boundaries Protect topsoil stockpile.	Soil texture, pH, Salinity, Sodium, Nitrates, Phosphates, Organic content, potassium, sand, silt and clay, Electrical Conductivity Site boundaries not extended /breached as per plan document Effective cover in Place.	Once in a season monitoring except for monsoon (once a year) in minimum 3 locations (1kg sample at every station)
4)	Ground water, Surface water & Wastewater Discharge	No direct discharge of Wastewater to be made to surface water, groundwater or soil. The discharge point would be selected properly and sampling and analysis would be undertaken prior to discharge. Take care in disposal of wastewater generated such that soil and groundwater resources are protected.	Colour, Temperature, Turbidity, Electrical Conductivity, Total dissolved solids, Total suspended solids pH, salinity, Dissolve Oxygen, Alkalinity as CaCO3, BOD, COD, Nitrate, Sulphates, Phosphate as PO4, Calcium Heavy Metals (Arsenic, Zinc, Cadmium, and Lead), Chlorides, Boron, Iron, Fluorides, Copper and Chromium, Total Coliform count Discharge norms for effluents as given in Permits	Once in a season monitoring except for monsoon (once a year) in minimum 2 locations in and around the site. Two litres of samples from each source, locations are chosen based on availability of ground & surface water body within study area.
5)	Drainage and Effluent Management	Ensure drainage system and specific design measures are working effectively. The design to incorporate	Visual inspection of drainage and records thereof	Periodic during construction activities

		existing drainage pattern and avoid disturbing the same.		
6)	Waste Management	Implement waste management plan that identifies and characterizes every waste arising associated with proposed activities and which identifies the procedures for collection, handling & disposal of each waste arising.	Comprehensive Waste Management Plan should be in place and available for Inspection onsite. Compliance with SWM Rules, 2016	Periodic check during construction activities
7)	Impact on Ecology (Flora & Fauna)	Vegetation, greenbelt / green cover development	No. of plants, species	Once in a season monitoring except for monsoon (once a year) at site
8)	Non-routine events and accidental releases	Plan will be drawn, considering likely emergencies and steps required to prevent / Limit consequences.	Mock drills and records of the same	Periodic during construction activities
9)	Health	Employees and migrant labour health check-ups	All relevant parameters Including HIV.	Regular check-ups as per Factories Act

6.3.2. Operation Phase:-

During Monitoring and auditing following procedures will be taken:-

- Reducing operational costs.
- Training the staff and defining the responsibilities.
- Facilitate adequate equipment and materials for proper handling of municipal solid waste.
- Providing write up to-date procedures specifying operational methods.
- Maintenance and calibration of the equipment both for operations and monitoring.
- Retention of record.

Regular monitoring of the various components of the physical environment is planned during the operations period of the facility and also during the post-closure period.

TBALE 6.2 ENVIRONMENTAL MEASURES DURING OPERATION PHASE

S.No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring & Locations
1)	Air Emissions	Gas quality from landfill areas	VOC, H2S, Methane & CO2	Monitoring every six months (as per CPCB guidelines & 24 hour reading as per NAAQS, 2009) at minimum of 3 locations near project site. Also EC norms given by MoEF&CC should be complied.
		Stack emissions from DG sets	PM_{10}, $PM_{2.5}$, SO_2, NO_x, CO, SO_2, HC, and as per NAAQ Standards & CTE conditions	
		AAQ within the Project premises.		
		All vehicles to be PUC Certificate.	Vehicle logs to be maintained	
		Meteorological data	Wind speed, direction, temp., relative Humidity and rainfall.	
2)	Noise	Noise generated from operations to be monitored	Noise intensity in dB(A) Day & Night, Leq, L min, L max, L10, L90, L50	Monitoring every six months (as per CPCB guidelines & 24 hour reading as per Standards) at minimum of 3 locations within 500 m with respect to project site.
3)	Wastewater Discharge (leachate)	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD and Oil & grease (heavy metals, if required),	• Daily at regular intervals • Once in a

			& Toxicity	month in house lab or by third party
4)	Solid waste/Hazardous Waste	Check compliance to applicable SWM rules	Quality & quantity Monitoring & records	Periodically CPCB norms.
5)	Ground & Surface Water Quality	Monitoring ground water quality, through piezometers	pH, salinity, total dissolved solids, BOD, Coliform count, DO, electrical conductivity, Chlorides & COD And as per CPCB guidelines	Once in a season monitoring except for monsoon (once a year) in minimum 2 locations in and around the site. Two litres of samples from each source, locations are chosen based on availability of ground & surface water body within study area as per CPCB norms.
6)	Flora and Fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Once a year
7)	Soil quality	Checking & Maintenance of good soil quality around	Soil texture, pH, Salinity, Sodium, Nitrates, Phosphates, Organic content, potassium, sand, silt and clay, Electrical Conductivity and Heavy Metals.	Monitoring every six months (as per CPCB guidelines) at 3 locations. 1kg sample at every station.
8)	Health	Employees and migrant labour health check ups	All relevant parameters (BP, HIV, Chest X-ray, Eye vision, etc.) and HIV for workers	Regular check-ups as per Factories act.

6.2 (A) ENVIRONMENTAL MEASURES DURING POST OPERATIONAL PHASE

S.No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
1)	Air Emissions	Gas quality from landfill areas	VOC, H_2S	As per CFE conditions given by SPCB or EC conditions given by MoEF&CC and as per CPCB protocol.
		AAQ within the project Premises. All vehicles to be PUC Certificate.	As per CFE conditions / NAAQ Standards Vehicle logs to be maintained.	
		Meteorological data	Wind speed, direction, Temperature, relative Humidity and rainfall.	
		Stack emissions from WTE plant		
2)	Wastewater Discharge (leachate) if present	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD, Oil & grease,	Once in a month (during initial period more regularly)
3)	Ground Water Quality and Water Levels	Monitoring ground water quality, and water levels within	As per CPCB protocol	Periodically and CPCB protocol
4)	Flora and Fauna	Vegetation, greenbelt / green cover development.	No. of plants, species	Once a year
5)	Health	Employees and migrant labour health check ups	All relevant parameters (BP, Sugar, chest X-ray, Eye vision, etc.) and HIV for workers	Regular check-ups as Per Factories Act.

6.4 Public Health Monitoring

There are three-stage health-monitoring program is proposed.

- Monitor the health of workers within the project site to identify adverse health effects.
- Periodically obtain feedback from local doctors regarding any potential indicators of adverse health effects due to environmental cause in the communities surrounding, and particularly down-stream of the landfill.
- By organizing health camps on regular basis.

CHAPTER - VII

ADDITIONAL STUDIES

7.1 INTRODUCTION

The additional studies carried out for the proposed Integrated Solid Waste Management Facility with Waste to Energy of 25 MW capacity at Bandhwari Village, Gurugram District, Haryana. The proposed integrated MSW processing and disposal facility will be established to handle about 2100 TPD with 25 MW waste to energy plant.

One month additional study has been done during February 2019 for the following aspects-

A. Hydrogeological and Heavy metal contamination study
B. Air quality monitoring & modeling
C. Ecological and Biodiversity study
D. Health Survey

7.2 HYDROGEOLOGICAL STUDY

The major part of Gurugram district is underlain by Quaternary alluvium consisting of sand, clay and silt. The quartzite ridge trending NNE-SSW is located about 7 km east of town in which ground water occurs in fractures, joints and crevices. Sandy layers at various depth form major water bearing horizons above the crystalline basement. Ground water in the Gurugram block occurs in unconfined and semi-confined condition. The upper zone of saturation consists of fine sand with silt varying from place to place .In Udyog vihar and city area the depth of first aquifer varies from 34 to 43 mbgl. However in industrial area of Manesar top most aquifer can be encountered at 20m. The thickness of sandy layer is very limited. The drawdowns are generally high indicating absence of highly potential ground water bearing aquifers. Tube wells in the depth range of 45 to 90 m bgl have been installed by different agencies in the block. The yield of these tube wells varies in different areas ranging within 129 to 606 lpm.

(Source-CGWB Gurugram)

Groundwater Status

Detailed study of Hydrogeology of study area was carried out and report was produced. In a hard rock area availability of ground water is scanty. It is thus mandatory to study the behavior of Ground water based on its occurrence. Field study reveals that ground water in the broad area

occurs in 2(two) horizons viz. 16 m bgl. (Dug well depth) and 30 -90 m bgl (hand pump & tube well depth average). In the core plant and buffer zone (10 Km radius), ground water level generally varies from 3.00m to 5.00m bgl with the exception of the southern eastern part of buffer zone area, where the recorded water level varies between 4m-6m bgl. The southern portion of the Sirohi and Pali area, which is in a structural plateau, sandstone hills are exposed, ground water occurs in fractures and joints and the availability of ground water is very limited. Only large diameter dug wells are feasible as a ground water abstraction structure. Water table contour also reflects that Ground water flows from NE to SW and from East to West direction towards Li Nala, a Sharpur Nala. Water table in the surroundings of plant area ranges from 200 m to 292 m above Mean Sea Level (msl). Ground water by and large occurs under unconfined condition in the upper saturated zones and semi confined to confined condition in the deeper aquifers. It is observed that in a topographic low area (South of Gothada Mohabtabad). During field investigations water level has been measured from the available Dug wells and Tube wells (monitoring stations). Ground water analysis data has been given in table no. 3.11 & 3.12 of chapter 3 with the help of a GPS instrument, co-ordinates and altitudes of the monitoring stations have been determined.

Occurrence of Groundwater in study area

The groundwater in the area studied occurs under water table to confined conditions. The occurrence and movement of the groundwater is controlled by structural parameters and physiographic conditions. A formation varies with rock type. The weathered and fractured zones occurring at shallow depths provide scope of ground water storage and movement.

TABLE 7.2: OCCURRENCE OF GROUND WATER IN THE DIFFERENT LITHOLOGY

Geomorphic Units	Site Soil/ Geological Conditions	Water Prospects
Fluvial origin Alluvial Plain	Gently undulating plains consisting of clay, silt, fine to coarse sand of varying lithology with extensive	Excellent
Alluvial Plain with Sand cover	Undulating plains comprising sand, silt and clay. Sand is dominant but stabilized.	Good

Palaeo Channel/Abonded channel	Channels which are cut off from main course of the river which is buried or abonded. Comprises of fluvial deposits. (sand, silt and clay particles)	Very Good
Denudational origin Pediment	Occurring near to structural hills gently sloping area comprising colluvium material and medium to fine grained sand and silt This unit has higher thickness near ridges and laterally merge with alluvial plain.	Moderate to Good
Intermontane Valley/Basin	Depression between mountains, formed as broad basin consisting of colluvial deposits covered with alluvium.	Excellent
Valley Fill	Unconsolidated material coarse to fine sand, silt and clay.	Good
Residual hills	Isolated low relief hill formed due to differential weathering consisting of met sediments.	Poor
Structural origin Structural Hills	Structurally controlled steep sides hills associated with folds, faults, fractures and joints these are meta sediments of Delhi super group	Poor to Moderate (moderate along fault planes)
Linear Ridges	Long narrow low lying linear to arcuate hills rising from alluvial plains acting as barriers of ground water flow.	Poor

(Source-CGWB Gurugram)

Depth to Water Table (Pre & Post Monsoon)

The ground water table in the area is 20-25m (in Post- monsoon) & 30-35m (in Pre Monsoon).

(Source-CGWB Gurugram)

7.3 RAIN WATER HARVESTING & RECHARGING SYSTEM

The groundwater recharge is a complex function of precipitation, soil type, geology, water level and soil moisture, topography, and evapo transpiration. Precipitation, evapo transpiration, water-table elevation, and soil moisture vary spatially as well as temporally, whereas soil type, geology, and topography vary only spatially. In addition to natural phenomena, water levels are affected by pumpage and man-made surface-water reservoirs and lakes, which in turn affect recharge. Under undisturbed conditions (e.g., prior to pumping), groundwater recharge is balanced by natural discharge of groundwater. To maintain a state of dynamic equilibrium, groundwater withdrawal by pumping must be balanced by:

- An increase in recharge,
- A decrease in natural discharge,
- A loss of storage and
- A combination of these factors.

Balancing pumping by increased recharge implies that recharge was rejected prior to the onset of pump age. This occurs primarily in outcrop areas of aquifers where the water table is near land surface. The rooftops of buildings act as catchment area which is effectively available. From rooftop harvesting water can be collected and supplied at the point of consumption.

Components of Rainwater Harvesting System

The common components of a rainwater harvesting system involved are:

Catchments: The catchment of a water harvesting system is the surface which directly receives the rainfall and provides water to the system. It can a paved area like terrace or courtyard of a building, or roof of a building.

Gutters: These are channels all around the edge of a sloping roof to collect and transport rainwater to the storage tank.

Conduits: Conduits are pipelines that carry rain water from the catchment or roof top area to the harvesting system.

First Flush: A first flush device is a valve that ensures that runoff from the first spell of rain is flushed out and does not enter the system. This needs to be done since the first spell of rain carries a relatively large amount of pollutants from the air and catchment surface.

Filter: To remove suspended pollutants from rainwater collected from roof filter media such as fiber, coarse sand and gravel may be used. This helps in removing debris and dirt from water before it enters the storage tank or recharge structure. Commonly used filter are: (i) Charcoal water filter (ii) Sand filter

Storage Facility: There are various options available for the construction of these tanks/reservoirs with respect to the size, shape and the material of construction. Maintenance means like cleaning and disinfection are required.

Recharge Structures: Rainwater may be charged into the groundwater aquifer through any suitable structures given below:

- Settlement Tank
- Recharging of service tube well
- Modified injection well

Significant Parameters for Design

Among the several factors that influence the rainwater harvesting potential of a site, eco-climatic conditions and the catchment characteristics are considered to be the most important.

Required Rainfall for Rainwater Harvesting Structures

Quantity: Rainfall is the most unpredictable variable in the calculation and hence, to determine the potential rainwater supply from the catchment, reliable rainfall data are required, preferably for a period of at least 14 years. Also it is better to use rainfall data from the nearest station with comparable conditions. The average annual rainfall at Gurugram Rain Gauge Station for period 2004 to 2017 is 471.53 mm. (Average).

Pattern: The number of annual rainy days also influences the need and design of rainwater harvesting. The average number of annual rainy days recorded at Gurugram R G station are 28 days, 90% of them are spread over three months, monsoon period.

Catchment Area Characteristics

Runoff depends upon the area and type of the catchment over which it falls as well as surface features. All calculations relating to the performance of rainwater catchment systems involve the use of runoff coefficients to account for losses due to spillage, leakage, infiltration, catchment surface wetting and evaporation which will all contribute to reducing the amount of runoff. Most of the precipitation falling on the surface runs off and percolates into the soil which is then discharged in low lying areas. In addition to runoff, a significant portion of the precipitation is lost by evaporation transpiration (ET), leaving only a small fraction of the precipitation to infiltrate into the subsurface and recharge the aquifer. A study of physiographic maps of the buffer zone area reveals that the terrain is more or less flat with minor undulations formed by sand dunes. The area does not have any prominent drainage system and only internal drainage occurs. The rainwater either accumulates in localized depressions or disappears beneath sand dunes after travelling short distances.

Rainwater Harvesting Potential in Study Area

In the study area (buffer zone) of the Municipal Corporation, Gurugram Plant area Rooftop Rainwater harvesting Structures can be carried out using rainwater available from roof top of buildings proposed to be constructed within Plant area and various villages situated in the buffer zone. Rainwater Recharging structures are proposed to be constructed for augmenting the availability of groundwater sources by rooftop rainwater harvesting.

Rainwater Available from Rooftop

The rainwater available from roof tops of buildings in the selected villages of buffer zone may be utilized for storage and / or recharging the groundwater through recharge shaft/well. Based on availability of rooftop area, the rainwater runoffs in each of the villages have been estimated separately. The location of these villages has been shown in Key Plan.

Proposed Rooftop Rainwater Harvesting Structure

For the available rainwater runoff in and surrounding the Plant area it is proposed to recharge the rooftop runoff into groundwater aquifer through recharge shaft / well. The rainwater runoff available from rooftop has been given in Plate 8.1 & 8.2. The total volume of 18980 m3 rainwater proposed to be harvested and shall be available for recharge through suitable harvesting and recharge structures, whereas the dimensions of these recharge structures have been given in Plate 8.1 & 8.2, figure-8.1 & 8.2. The Plant area will be proposed construction of Rooftop Rain Water Harvesting Structures on different small streams in the core zone of the plant area, which size are 6m x 3m x 1.5m. (Length X Width X Height).

TABLE 7.3: CALCULATION NO. OF RHW STRUCTURES

Sr. No.	Type of Structure/ Surface	Area {A} (Sq. m.)	Run off Coefficient {C}	Intensity of rainfall {I} (m/annum)	Total discharge [Q= CIA] (m3/ annum)
1	Roof Top	40250.00	0.90	0.47153	17081
2	Cemented Paved Area	11080.00	-	-	-
3	Green Belt Area	40666.00	-	-	-
4	Open Area	31234.00	-	-	-
Total		123230.00	-	-	17081

Calculation of annual recharge

Total Annual Recharge to Ground Water Regime of the area through rainwater harvesting structure would be 17081 m3/ annum. The rain water harvesting structures are calculated on the basis of peak intensity of rainfall recorded as 80 mm/hr. considering 15 minutes of peak rainfall. The same has been done to avoid flooding of the area.

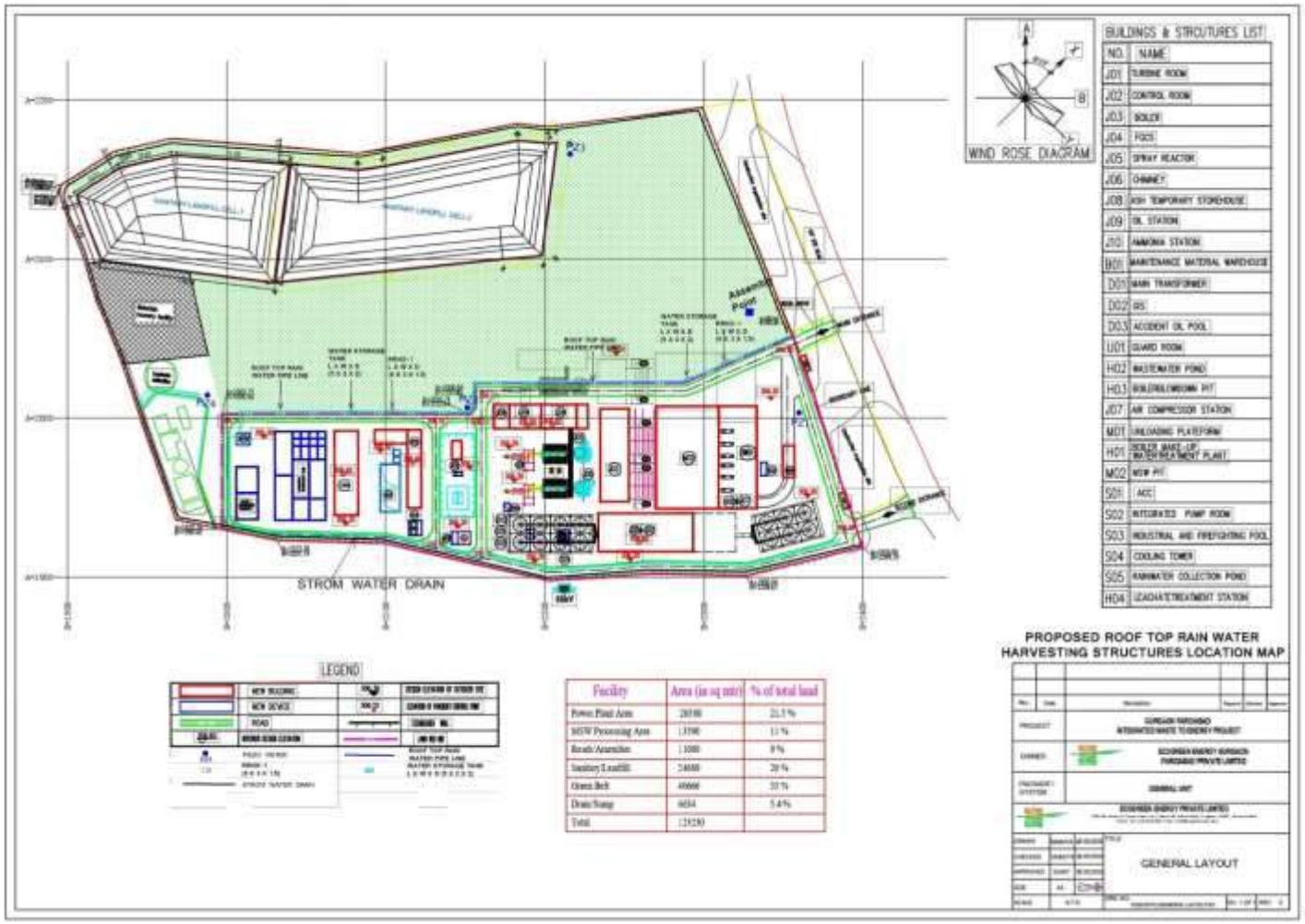
TABLE NO 7.4: DIMENSIONS OF RAINWATER HARVESTING STRUCTURES

Total Rain Water Flow	4012 m3/hr
Considering 15 minutes of peak rainfall, Runoff volume	1000 m3 say 550 m3
Volume of each pit	27 m3 (6 m x 3 m x 1.5m)

Total no. of rain water harvesting pits required	Total run-off volume/volume of each pit = 1000/54 = 18.51 say 2 nos.

Therefore, 2 No's Roof top Rain Water Harvesting pit of size 6 m length x 3 m width x 1.5m depth with PVC slotted pipe up to minimum depth of 30 m. & 2 Nos. (Length X Width X Height).

FIGURE NO. 7.1 LOCATION SELECTED FOR ROOFTOP RAINWATER HARVESTING



7.4 RISK ASSESSMENT & DISASTER MANAGEMENT PLAN

The principal objective of the risk assessment study is to identify and quantify the major hazards and the risk associated with various operations of the proposed project, which may lead to emergency consequences (Disasters) affecting the public safety and health. Based on this information, an emergency preparedness plan is to be prepared to mitigate the consequences. The approach involves hazards identification, assessment, valuation and developing Disaster Management Plan (DMP).

7.4.1 Risk analysis

Risk analysis includes an estimate of the probability or likelihood that an event will occur. Estimation of random incidents totally uncorrected with plant activities may also be taken. Risk can be characterized in qualitative terms as high medium or low, or in quantitative terms using numerical estimates and statistical calculations. For practical purposes a risk analysis may be based on a subjective, common-sense evaluation. Both probability and consequences are extremely important in evaluating risk. A high risk situation can be the result of a high probability with severe consequences (e.g. irreversible health effects or death due to an airborne toxic dust, a fire or explosion with Injuries or fatalities), whereas moderate risk situations can be a result of either high probability with mild consequences or low probability with more severe consequences.

In order to be in a state of readiness to face the adverse effects of accidents, an Emergency Preparedness Plan (EPP) has to be prepared. Such a plan must. Inter-alia, cover the possible hazardous situations in the locality and the causes, areas most likely to be affected, on-site and off-site plans, establishment of Emergency Control Centres (ECC), location of emergency services and duties of officers/staff during emergency.

The following major hazards are anticipated in the proposed project:-

- Hazardous pertaining to fires in project / plant area
- Fire in diesel storage areas, garbage storage area and disposal areas
- Natural disaster (Earthquakes, flooding etc.)
- Electrical accidents,
- Flooding from man-made causes,

- Rainfall induced landslides,
- Environmental & Health Aspects

7.4.2 Disaster management plan

Emergency preparedness and prevention through good design, operation, maintenance and inspection is essential to reduce occurrences of eventualities. The overall objectives of the DMP is to make use of the combined resources at the site and outside services to achieve the following-

- Localize the emergency on property and people
- Minimize effects on property and people
- Effective rescue and medical treatment
- Evacuation

In order to be in a state of readiness to face the adverse effects of accidents, an Emergency Preparedness Plan (EPP) has to be prepared. Such a plan must. Inter-alia, cover the possible hazardous situations in the locality and the causes, areas most likely tombe affected, on-site and off-site plans, establishment of Emergency Control Centres (ECC), location of emergency services and duties of officers/staff during emergency.

On-site Disaster-

If an accident/incident takes place within industrial area and its effects are confined to the premises, involving only the persons working in the Industrial area and the property inside the Industrial area, it is called as on-site disaster.

Off-site Disaster

If the accident is such that its affects inside the industrial area are uncontrollable and it may spread outside the premises, it is called as off-site disaster.

(A) On-site Disaster Management Plan-

Main Elements of On-site Emergency Plans-

- Leadership and administration.
- Role and responsibilities of key personnel.
- Emergency action.

- Light and power.
- Source of energy control.
- Protective and rescue equipment.
- Communication.
- Medical care.
- Mutual aid.
- Public relation.
- Protection of vital records.
- Training.
- Periodical revision of plan

Action Plan for on-site Disaster Management Plan:-

7.3.2.1. Control Centre

This is the main centre from where the operations to handle the emergency are directed and coordinated. Facilities to be made available in the control centre are:

- Internal and external communication.
- Computer and other essential records.
- Daily attendance of workers employed.
- Storage of hazardous material records and manufacturing records.
- Pollution records.
- Plan of the industrial area showing:
  a) Storage area of hazardous materials.
  b) Storage of safety equipment.
  c) Fire fighting system and additional source of water.
  d) Site entrance, roadway and emergency exist.
  e) Assembly points.
  f) Truck parking area.
  g) Surrounding location.
- Note Book, pad and pencil.

- List of Key Personnel with addresses, telephone number etc.

TABLE 7.5 KEY PERSONS AND THEIR RESPONSIBILITIES DURING EMERGENCY

S. No.	Key Person	Responsibilities
	Site Main Controller	• On reaching he will assess the magnitude of the situation in consultation with Incident Controller and decide whether inside or outside help are to be called (i.e. Fire Service, Police, and Ambulance etc.). • Ensure that key persons are called in. • Give guidance and direction in vital and important activities to control the emergency situation. • Direct to close down and evacuation of the plants in consultation with Incident controller and key personnel. • Inform the government authorities such as Collector, MC, Factory Inspector, Health Officer & Medical Officer and request them for their help as situation demands. • Give prime importance to human life and guidance in organizing the rescue operations as well as ensure whether injured people getting proper medical attention in time. • Always be in touch with the Incident Controller to get further progress and decide further plan. • On completion of emergency situation declare the normalcy through Administrative Officer. • Control the re-occupation of the affected areas on discontinuation of emergency. • Do not permit to re-start the plant unless it is safe.

		• Give authentic statement of the incident to news media & government authorities.
	Incident Controller	• Take the charge of situation and assess the magnitude of the event. • Control and guide all the operations with priorities to the safety of personnel, minimize pollution, loss of material and loss to the plant equipment and property. • Provide advice and guide to the fire fighting and rescuing squad and fire brigade while they arrive. • Establish communication with emergency control centre. • Report on all significant developments to the emergency control centre through phone/messenger. • Ensure that evacuation of the areas in the factory getting affected is complete. • After the emergency situation is brought under control, assure that the necessary evidence for further investigation in the incident is preserved and inform Site Controller regarding control of emergency.
	Technical Staff / Department Head	• As soon as informed, rush to the spot and take charge of the situation till senior group arrives. • Ensure that emergency siren is raised which gives information to security, safety, administration staff and technical staff. • On arrival of Incident Controller, inform him about the gravity of the situation and then to work

		under his guidance to control the situation. • Ensure that only experienced and essential people remains at the location for controlling, while others to be evacuated from the scene.
	Employees Near The Spot (Incident Area)	• Tackle the emergency as per laid down procedures for the area bearing in mind the requirements of the situation called for by the progress of the emergency. • Remove all non-essential employees (who are not assigned any emergency duty) to evacuate the area and gather at the specified assembly points. • Stop the operations as per the information of the Incident Controller.
	Employees Of Other Department	• On getting information of incident, take permission of superior and confirm own plant, department, safety and then after trained and skill persons will rush to incident spot with necessary personnel protective equipment. • Approach the spot from up wind direction and assemble at safe place near to the spot taking in to consideration the wind direction. • Extend help to control the situation as per the instruction and guidance given by the senior persons controlling the operation.
	Personnel Officer	• Basically he will work as a Liaison Officer and will station at emergency control centre during emergency. He will work under the direction of Site Controller.

		• To ensure that the casualties receives adequate attention at first aid centre, also ensure additional help if require from government authorities or outside agencies. • Arrange transport facility for injured personnel to get timely medical help. • He will also arrange for head count at assembly points and will inform Site controller. • Also be in touch with the security and other departments for help. • Will check the roll call from time office for availability of trained personnel during emergency situation at the site. • Determine the need to inform statutory authorities of the accident and fill the necessary forms for submission with consultation of the Site Controller. • When emergency is prolonged, arrange for the relief of personnel as well as inform the families of injured persons and • Organize refreshments / catering facility. • When emergency declared immediately rushed to emergency control centre.
	Administrative Officer	• When emergency declared, immediately rushed to the emergency control centre and establish contact with Site Main Controller. • Ensure the communication between site controller and incident controller. Keep messenger for communication. • Make arrangement to send portable megaphone and

		torches to the Incident Controller if required. • On receiving instructions from Site Controller, organize transportation for the evacuation of people from the assembly points. • As per instructions from Site Controller will inform to head office, insurance surveyor, other relevant authorities and neighbouring areas. • On getting instructions from site controller / incident controller, he will be in touch with other Industries for help in emergency. • Will arrange to announce necessary instructions for all personnel. • Ensure that telephone operator keeps the EPABX free to extend possible for incoming calls. • Ensure that press and other media do not publish unauthentic news.
	Engineering Services Key Personnel	• When emergency declared, immediately proceed to Emergency Control Centre. • Ensure the availability of electrical wiremen, utility, maintenance employees and drivers. • Ensure the water supply & electric power generator in case of power failure. • Be in touch with the site controller / incident controller to extend help as and when required. • Arrange the vehicle as per required by administrative /personnel officer.
	Security & Fire In-Charge	• On getting instruction from site controller/incident controller, cordon the affected area to maintain law and order.

		• As per instruction from site controller/ incident controller, arrange to use the fire extinguishers. • Ensure the following duties by security guards. Stop all vehicles and visitors entering into the factory, except any government authorities such as fire brigade, police, factory inspector, medical staff and inform administrative officer on their arrival. • If any press reporter and local leader come at the main gate, take them to administration office. • Do not allow any vehicle to park at the main gate or nearby at main road. • Assure that the entrance of the gate is clear for thorough fare. In similar way control/ guide internal traffic for smooth operations. • Act according instructions given by personnel and administrative officer. • Ensure that all essential personnel evacuated and assembled at assembly points. • Arrange effective security nearby the incident place
	First Aid Attendants	• As per the instructions given by incident controller, arrange the supply of additional emergency related equipment to the incident place. Give necessary First Aid treatment to the affected persons immediately. • Inform the personnel and administration officer regarding the severity of injury and advice for further medical help if necessary. • Ask for additional trained first-aider, if required. • On arrival of doctor, assist him to give medical treatment to the affected people.

	Safety Officer	• On hearing emergency siren rush to the spot and assume the position of incident controller and take care of the situation till a senior personnel arrives and on their arrival work with them in team, extending their own expertise. • Give instructions and guideline to the people involved in control measures. As well as help in providing required PPE. • Give instructions to the safety attendants. • Brief the site main controller about the progress of control measures. • Advise site controller regarding type of help required from outside. • Give instructions to other department through internal phones /Communication Officer. • Make arrangement to carry out monitoring whenever necessary and appraise results to the concerned seniors.
	Driver	• On getting information from communication officer remain alert and wait for further instructions along with Ambulance van to meet with emergency. • Extend help to shift the injured people from site of incident to first-aid and if required to hospital through ambulance / other vehicle.
	Electrical / Utility Personnel	• After getting the information rush to the spot with necessary personal protective equipment and if instructed by incident controller cut off the power supply to the affected area. • Ensure that the D.G. Set is in running condition.

		• Extend help to the Utility operator in maintaining adequate supply of water and others under guidance of supervisors.

Information of Assembly Points

At the time of emergency, non - essential workers, casual workers, visitors and others are to be replaced to assembly points and separate in charge are nominated. Number ofAssembly points and location are decided based on the layout of the plant.

In case of an emergency, the visitors, contract persons and factory employees will gather at nearby assembly point. Pre-designated persons will take their roll call. If needed, they can be evacuated easily through any gate in a short period as per instruction of site main controller.

For outside help, company authority will make a mutual understanding with the following Authorities to extend their help whenever an emergency occurs:

- Doctors from civil hospital
- Police station
- Fire brigade

Time to time company has to inform/impart training to concerned employees for awareness about chemicals and its hazards and the precautionary measures on their part. An emergency guide will be provided to each employee, which gives guidance to him or her during an emergency.

(B) Off-site Disaster

The main objectives of the off-site emergency plan are:

- To save lives and injuries.
- To prevent or reduce property losses.
- To provide for quick resumption of normal situation or operation.

Chemical accidents (Emergency Planning, Preparedness and Response) Rules, 1996 Prescribes for the constitution of the State Crisis Group as apex body at the State Level to deal with major chemical accidents and to provide expert guidance for handling major chemical accidents. Schedule 7 and Schedule 8 of the Chemical Accidents (Emergency Planning, Preparedness and Response) Rules, 1996 prescribes for the constitution of District and Local Crisis Groups.

(i) Functions of the State Crisis Group:-

- Review all district off-site emergency plans in the State with a view to examine its adequacy in accordance with the Manufacture, Storage and Import of Hazardous Chemical rules and forward a report to the central crisis group once in three months.
- Assist the state government in managing chemical accidents at a site .
- Assist the state government in the planning, preparedness and mitigation of major chemical accidents at a site in the state.
- Continuously monitor the post-accident situation arising out of a major chemical accident in the state and forward a report to the central crisis group.
- Review the progress report submitted by the district crisis groups.

(ii) Functions of the District Crisis Group:-

- Assist the preparation of the district off-site emergency plan.
- Review all the on-site emergency plans prepared by the occupier of major accident hazards installation for the preparation of the district off-site emergency plan.
- Assist the district administration in the management of chemical accidents at a site lying within the district.
- Continuously monitor every chemical accident.
- Ensure continuous information flow from the district to the Centre and State Crisis Group regarding accident situation and mitigation efforts.

- Forward a report of the chemical accident within fifteen days to the State Crisis Group.
- Conduct at least one full scale mock-drill of a chemical accident at a site each year and forward a report of the strength and the weakness of the plan to the State Crisis Group

(iii) Functions of the Local Crisis Group:-

- Prepare local emergency plan for the industrial pocket.
- Ensure dove tailing of local emergency plan with the district off-site emergency plan.
- Train personnel involved in chemical accident management.
- Educate the population likely to be affected in a chemical accident about the remedies and existing preparedness in the area.
- Conduct at least one full scale mock-drill of a chemical accident at a site every six months and forward a report to the District Crisis Group.
- Respond to all public inquiries on the subject

Central Control Committee

As the offsite plan is to be prepared by the Government, a Central Control Committee Shall be formed under the Chairmanship of the District Collector. Other officers from police, fire Service, factory inspectorate, medical department shall be incorporated as Members of the Central Control Committee. Under the Central Control Committee the following committees shall be constituted under the control of the District Collector.

- Incident and Environment Control Committee
- Fire Control Committee
- Traffic control, law and order, evacuation and rehabilitation committee
- Medical help, ambulance and hospital committee
- Welfare, restoration and resumption committee
- Utility and engineering services committee
- Press, publicity and public relations committee

The off-site Emergency Plan shall be prepared by the District Magistrate in consultation with the factory management and Govt. agencies. The plan contains up-to-date details of Outside emergency services and resources such as fire services, hospitals, police etc. with telephone number. The district authorities are to be included in the plan area.

- Police Department
- Revenue Department
- Fire Brigade
- Medical Department
- Municipality
- Gram Panchayat
- Railway Department
- Telephone Department
- Factory Department
- Electricity Department
- Pollution Control Department
- Explosive Department
- Press and Media

7.5 IDENTIFICATION OF MAJOR HAZARD INSTALLATIONS BASED ON GOI RULES, 1989 AS AMENDED IN 1994 AND 2000:-

By studying accidents occurred in industries in India over a few decades, a specific legislation covering major hazard activities has been enforced by Government of India in 1989 in conjunction with Environment Protection Act, 1986. This is referred here as GOI rules 1989. For the purpose of identifying major hazard installations the rules employ certain criteria based on toxic, flammable and explosive properties of chemicals.

7.4.1. Safety Precautions for the Storage of Fuel:-

- Separately stored with proper enclosures and marked within premises in closed Shed.
- Proper ventilation to be provided.
- Sufficient fire extinguishers and PPE to be provided.
- Flame proof fittings to be provided.
- Smoking to be prohibited.

7.4.2 Identification of Hazards:-

The first step in risk assessment is to identify the types of adverse health effects that can be caused by exposure to some agent in question, and to characterize the quality and Weight of evidence supporting this identification.

TABLE-7.6 IDENTIFICATION OF HAZARDS

S. No.	Hazard Name	Operability/ Condition/ Cause and Consequence	Control measures/ Action required
1.	**Physical hazards**		
A	Fire hazard in windrow Composting due to elevated Temperatures.	Fire hazard may exist with composting process as elevated temperatures and drying may increase the potential for Spontaneous combustion.	• Periodic mixing of composting material and maintenance of the proper water content should be done to control windrow compost Temperature and prevent fires. • A well-designed fire suppression system with sufficient water capacity and at sufficient pressures to adequately control a fire within the facility and approved by the local fire authority will be installed. • Portable fire extinguishers and fire control equipment in proper working condition, at the operating area of the facility.
	• Fire Hazard,	Possible causes of fires at composting facilities include:- • spontaneous combustion due to rise in temperature	• Unauthorised access to the premises to be prevented. • Banning lighting cigarettes, fires onsite • Regular monitoring of the quantity of gas being vented

		• Lightning strikes. • Cigarettes, • Build-up of particulate matter near engine manifolds and exhaust pipes of processing equipment. • Explosion due to build-up of methane inside the closed landfill in lack of adequate number of gas venting apparatus.	
	Heavy equipment's and machinery for waste tipping	During soil excavation and compost pile construction, workers may be seriously injured or killed by heavy equipment such as Front-end loaders and scrapers.	• When approaching operating equipment, the approach should be made from the front and within view of the operator, preferably making eye contact. • Heavy equipment should be equipped with a backup alarm that alerts workers.
	Rough sharp waste items	Workers may be exposed to puncture and cut hazards to feet and hands from rough or sharp waste material during composting operations.	Workers should wear safety boots with steel shanks to prevent Cuts to the bottom of the foot. Workers should minimize manual handling of waste material, and wear cut-resistant gloves if contact with waste materials is necessary.
	Trip Hazards	Trip hazards may exist	Workers should exercise caution

	due to pipes/ hoses	with hoses and piping systems used for Irrigation of the composting unit.	when walking over hoses and pipes. In heavily travelled areas, extra lighting may be needed to ensure walkways are adequately illuminated.
	Chemical Hazards		
	Confined spaces/ covered compost pads (CO_2, CH_4)	• Since a closed shed is proposed for the compost plant, it may be considered that the workers entering the facility enter a Confined space. • Elevated levels of CO_2 may accumulate during composting process. • It is also typical for some ammonia gas to be generated during composting. • Exposure to ammonia vapours may occur, especially during waste turning operations. • Although aerobic conditions should be maintained in the compost, if anaerobic	Prior to each entry into the enclosed or tented area, the atmosphere within the tent should be tested to ensure a safe Atmosphere. If the testing indicates atmospheric contaminants or oxygen depletion, a confined-space entry program should be developed and implemented.

		conditions are allowed to develop, methane and hydrogen sulphide may be generated.	
	Inhalation/ ingestion/ skin contact	Workers may be exposed to contaminants and degradation Products of contaminants. Exposure may occur via inhalation/ingestion/skin contact routes of exposure during loading, unloading, pre-processing, tilling, turning and other operations where soils are agitated.	An analysis of the work tasks and potential for chemical exposure should be performed to determine the correct personal protective equipment (PPE) and/or respirator cartridge(s), if needed. The analysis should include obtaining specific chemical hazard information to ensure that the PPE specified will be appropriate for the respective chemical hazard. Workers may also use respiratory protection including the use of an air-purifying respirator equipped with HEPA (N100, R100, P100) filters and Organic vapour cartridges.
	Chemical reactions within the stored mixed waste.	Some materials used in composting may be explosive, especially when in contact with other incompatible materials (e.g. ammonium nitrate and fuels). Others may be	• Workers should minimize contact with acidic or corrosive chemical materials by using mechanical chemical delivery methods. • Where contact is required, workers should wear gloves (e.g. nitrile) and other personal

		hygroscopic, which may result in chemical reactions.	protective equipment that is resistant to the Materials handled. • All chemical reagents used in composting should be segregated to prevent accidental mixing of reactive chemicals, especially Ammonium nitrate fertilizers and fuels.
	Biological Hazards		
	Allergies from pathogen and airborne dust	During dry and windy periods microbe-entrained dusts may become airborne from soil agitation. - Exposure to mold spores, including Aspergillus fumigates and thermophyllic actinomyctes, may occur during composting operations. - Inhalation of pathogenic microbes may cause allergic Reactions or illness.	• Periodic application of water to the active area. • Personal protective equipment, such as rubber gloves, should b used. • Respiratory protection (e.g. air-purifying respirator with HEPA (N100, R100, P100) filter/cartridge) may be used during dusty periods.
	Pests/ bugs at Site	Workers may be exposed to a wide array of	• Workers should be informed of the potential for snakes and

		biological hazards, including snakes, bees, wasps, massive fly hatches, ticks, hornets, and rodents which get attracted to the higher temperatures associated with composting operations and other hideout warm places.	other animals around the compost facility, especially during cooler periods. • Periodic inspections of the site should be performed to identify stinging insect nests and for the presence of snakes. Professional exterminating companies should be consulted for their removal.

7.6 IDENTIFICATION OF HAZARDS

7.6.1 Fire Hazard: - The following activities and precautions will be taken in order to prevent fire mishaps and to manage emergency situations during the operational phase of the project: -

- Fire protection equipment i.e. fire extinguishers shall be provided at the site.
- It will be advised to keep oxygen cylinders, medical kits and masks to prevent

Smoke inhalation.

- Maintenance of fire fighting equipment will be ensured by concerned person

At project site.

- Cover nose and mouth with wet and clean cloth as it prevents smoke inhalation.
- Avoid running around in the MSW facility as it leads to inhaling of more poisonous Gases.
- Ensure strict compliance to the evacuation plan and assist others to escape the site.

7.6.2 Natural Disaster: -

Natural disasters such as earthquakes, floods, hurricanes, landslide etc pose an eminent threat to the proposed project. As there is no way of avoiding such disasters, the following measures can be adopted in case of such occurrences.

Natural disaster	Action

Extreme weather conditions such as tornado or storm	Maintain correspondence with local Meteorological departments to have enough. Take shelter in facilities without windows.
Earthquake	Stay indoors and move to central parts of the building. People staying outdoor should stay outdoor and avoid being in near vicinity to any building or facility. In case of spread of toxic fumes from sanitary.
Flood	Landfill, close doors, windows and seal any cracks or gaps in the buildings. Turn off electricity to reduce risk of Electrocution. Decontaminate flooded rooms. Carry out official instruction over the radio or by loudspeaker.
Landslides	These are likely during monsoon or in heavy down pour conditions. The site conditions around the landfill should be identified for such events if occurred earlier and accordingly precautionary measures need to be taken during such events. The hierarchical set up needs to be planned to take action immediately so that the District Magistrate and other local authorities may be informed to take control of the situation.

7.6.3 Electrical Accidents: -

The electrical accidents may occur due to malfunctioning of electrical machinery or due mishap resulting due to short circuits in the LT/HT (high Tension /Low Tension) section of the landfill unit. Also another possibility of electrical accidents is due to leakage of moisture or water during rains when there is ingress of water or moisture due to failure of the

enclosure or cover over the electrical apparatus or at distribution point or at the receiving section of HT/LT cable.

The electrical accidents may cause secondary accidents such as fire or burns to the operator/s of the equipment or machinery. To avoid such incidents, regular maintenance of electrical wiring/LT/HT section and distribution panel/s may be done periodically as recommended by competent person. Also a certificate to that effect may be kept in display for information of all. The safety aspects as covered under safety requirements as prescribed by the concerned safety inspector need to be followed up for prevention of such accidents.

7.6.4 Environmental & Health Aspects:-

There are potential risks to environment and health from improper handling of solid wastes. Direct health risks concern mainly the workers in this field, who need to be protected, as far as possible, from contact with wastes. For the general public, the main risks to health are indirect and arise from the breeding of disease vectors, primarily flies and rats.

7.6.4.1 Environmental Aspects:-

The most obvious environmental damage caused by municipal solid wastes is aesthetic, the ugliness of street litter and degradation of the urban environment and beauty of the landscape. More serious, however, and often unrecognised, is the transfer of pollution to water, ground water. Air pollution can be caused from the inefficient burning of wastes, either in open air, or in plants that lack effective treatment facilities from the gaseous effluents. The generation of stinking odour around the site is a major source of discomfort amongst the inhabitants. The local wind conditions may aggravate this problem further.

7.6.4.2 Health Aspects:-

Epidemiological studies have shown that a high percentage of workers who handle refuse, and of individuals who live near or on disposal sites, are infected with gastrointestinal parasites, worms and related organisms. Contamination of this kind is likely at all points

where waste is handled. A major adverse impact is due to the attraction of rodents and vector insects for which it provides food and shelter. Further the decomposing matter in the landfill is the beehive for flies and other insects and disease vectors such as cholera, typhoid, dysentery, malaria, jaundice and other communicable diseases particularly skin problems, nausea, vomiting, headaches induced in the inhabitants around the site.

Project proponent carries out the following checks to curb the problem:

- Pre - employment medical check-up at the time of employment.
- Annual medical check-up for all employees.
- First aid training for to the employees.
- Monitoring of occupational hazards like noise, ventilation, chemical exposure to be carried out at frequent intervals, the records of which to be documented.

Mitigation measure -

All precautionary measures should be taken to avoid foreseeable accidents like spillage, Fire and explosion hazards and to minimize the effect of any such accident and to combat any emergency at site level. Some of the preventive safety measures to be taken to minimize the risk of accident with respect to technical safety, organizational safety and personal safety are listed below:

- All reasonably practicable measures to minimize the risk of such accident in Compliance with the legal obligation under the relevant safety.
- Safety features such as fire extinguishers, fire hydrant system and suitable Personal Protective Equipment (PPE) to be provided. Regular operations and testing of fire extinguishers to be carried out.
- Training of workers and staff to be given for safe waste, fire fighting, first aid and integrating safety, in all activities.
- Accident / Incident reporting system and information of employees about the same to be done for better awareness.
- Personal Protective Equipment (PPE) like goggles, safety shoes, helmet, apron, earplugs, facemask & clothing to be provided to employees as per the job requirements.

7.6.4.3 Leachate and Storm Water Management during Monsoon

- Leachate treatment plant is designed to accept excess leachate generated during the monsoon period.
- A very critical aspect in wastewater management would be minimization of generation of leachate/ wastewater.
- To minimize the same we propose to keep a maximum portion of the landfill covered especially during the monsoon, thus minimizing the generation of leachate.
- Water collected in the pond shall be tested for storm water quality parameters and if it meets the discharge standards shall be discharged, otherwise the same Shall be considered as leachate and sent to the leachate treatment plant.

7.7 BASIS OF PLAN AND HANDLING OF EMERGENCY:-

- It is not possible to envisage and detail every action, which should be taken during an emergency. The basic philosophy is to get key personnel of necessary discipline who have the knowledge and background to assess the situation and give directions as per the objectives as quickly as possible.
- The plan identifies the services/departments required to combat emergencies and also identifies the key persons to discharge the duties.
- Key personnel have been identified for emergencies and are responsible for providing necessary assistance.
- Messages via telephones are restricted to key personnel only. This is required to keep the telephones free for key personnel to contact for necessary feed-back.
- Senior person who arrives on scene is automatically in charge for the service group. He should not leave the site without entrusting the charge to his deputy. All the key personnel should be available at the main control room. All key personnel of other services to report to main site controller, whom to coordinate between various departments and outside agencies

Personal Protective Equipment (PPE)

- Face masks
- Hand gloves

- Gum boots
- Goggles
- Helmets
- Safety belts
- Aprons

Equipment list

- Internal / External telephone
- Portable alarm
- Torches
- Emergency cupboard with necessary PPE.

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CHAPTER - VIII

PROJECT BENEFITS

8.1 INTRODUCTION

The proposed Integrated Solid Waste Management facility with waste to energy plant of 25 MW capacity at Bandhwari Village, Gurugram District, Haryana by Gurugram Municipal Corporation has been planned and designed with a view to reduce the problem associated with disposal of unprocessed municipal waste as landfill, thereby complying with the various regulations of scientific management of MSW of SWM rules 2016 and CPCB guidelines as well as the objective and goal set for the country under the Swachh Bharat Mission (SBM). The tangible and intangible benefits of the proposed project are as follows:

8.2 CONSERVATION OF LAND RESOURCES

The amount of available land for landfill in Bhandwari Village, Gurgaon is finite. Further, it is not a sustainable option to simply dump MSW into landfill. The proposed project will reduce burden on landfill by efficient RDF production from MSW and further electricity from it.

8.3. COMPOST PRODUCTION

The proposed project will have direct and indirect economic benefits in form of employment, development of ancillaries, establishment of service facilities, development of telecom and transportation facilities. Besides the compost production would add to the revenue to the operator of the landfill. The production of compost shall also enhance the crop productivity and improvement in the soil texture and enhancement of soil nutrients. The compost produced from the composting pads and vermin composting unit can be used as soil conditioner that improve soil quality. This compost has the ability to help regenerate poor soil by increasing nutrient content in soil and retain moisture.

The following benefits are being envisioned:-

- Use of compost produced as manure to the crops.

- Generation of revenue through the sale of compost produced from the MSW processing and disposal facility.

8.4. BENEFITS OF LANDFILL

Landfills minimize the natural impact of solid waste on the environment by the following ways:-

- Isolation of inert waste through containment
- Elimination of polluting pathways

8.5. RECYCLING

A number of recyclable materials, for example paper, glass, plastic, rubber, ferrous and non-ferrous metals present in the MSW are suitable for recovery and reuse. This will benefit rag pickers.

8.6 IMPROVEMENT IN PHYSICAL INFRASTRUCTURE:

The proposed project is expected to yield a positive impact on the socio economic Environment. It helps sustain the development of this area including further development of physical infrastructural facilities. The following physical infrastructure facilities will improve due to proposed project.

- Road transport facilities
- Housing facilities
- Water supply and sanitation
- Power

8.7 IMPROVEMENT IN SOCIAL INFRASTRUCTURE

Agriculture & plantation are one of the basic sectors of employment for the local people in this area. The project will lead to indirect and direct employment opportunity. Employment is expected during operation period, garbage lifting and other ancillary Services. Employment in these sectors will be temporary or contractual and involvement of unskilled labour will be more. A major part of this labour force will be mainly from local

villagers who are expected to engage themselves both in agriculture and project activities. This will enhance their income and lead to overall economic growth of the area. The Proposed project will result in improving the sanitation of the city in compliance with the Solid Waste Management Rules, 2016 and amendments.

8.8 EMPLOYMENT POTENTIAL

In this project number of skilled and unskilled local workers will be employed. The project will generate direct and indirect employment. Preference will be given to the local people for employment based on their educational qualifications and experience. Manpower requirement for the proposed project will be approx. 2100 people consists of contractual & non contractual workers (i.e. Officers, skilled workers, Semi-skilled, EHS officers, Plant Staff etc.) during operation phase. The labourers will also get trainings for skill development. The local people will be preferred for contract jobs during operational stages of the project.

8.9 OTHER PROJECT BENEFITS

Benefit to the Urban Local Body: Due to implementation of this project, the ULB involved i.e Gurgram & Faridabad will comply with the SWM Rules, 2016, wherein it has been stated that the ULBs are responsible for scientific collection, transportation, Segregation and disposal of municipal solid waste within this limits.

Organised Collection of MSW: The systematic collection, transportation, segregation and disposal of the municipal wastes will lead to an organized, accountable and reliable mechanism of disposal of waste.

Compost Facility: The segregated waste will have composting facility (to obtain composted fertilizer), RDF (as a source of alternative fuel from waste), which otherwise would have been wasted if dumped indiscriminately.

Environmental Benefits: Regular monitoring of the surrounding will keep the area environmentally safe and under any adverse circumstance, immediate measures will be taken and enacted upon.

The proposed project will utilize approx. 2100 TPD of MSW. Utilization of such a huge quantum of MSW in the WtE plant will improve the sanitary and hygiene condition of residents of Gurgaon & Faridabad cities. Further, it will enhance the environmental aesthetics due to avoidance of landfill mound.

The overall effect will improve buying power of employees and thus a higher standard of living viz. better education, improved health and sanitation facilities housing and acquisition of consumer durable. This is envisaged as a major positive benefit.

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CHAPTER – IX

ENVIRONMENT MANAGEMENT PLAN

Environmental Management Plan (EMP) is a site specific plan developed to ensure that the project is implemented in an environmental sustainable manner.

This EMP also describes the role and responsibilities of staff supervising the project from Head office, personnel deployed at the project site and contractors, if any, who will be responsible for implementing this EMP.

9.1 Environmental and Social Management Cell

For the effective and consistent functioning of the project, an Environmental Management Cell (EMC) will be established for the project.

The major duties and responsibilities of Environmental Management Cell will be as follows

- To implement the environmental management plan.
- To assure regulatory compliance with all relevant rules and regulations.
- To ensure regular operation and maintenance of pollution control devices.
- To minimize environmental impacts of operations as by strict compliance to the EMP.
- To initiate environmental monitoring as per approved schedule.
- Review and interpretation of monitored results and corrective measures in case monitored results are above the specified limit.
- Maintain documentation of good environmental practices and applicable environmental laws as ready reference.
- During operation phase project handling of bag filter, dust control measures, Ash management, handling of cooling towers and handling of water from various process of the plant, treatment of sewage, provision of rain water harvesting and maintenance, trainings to the workers, control of fire hazard, laboratory, green belt

development and will be handled by EMC/EHS team and environment engineer's team designated to the project.

- Maintain environmental related records

TABLE NO. 9.1 EXISTING EHS/SHE/ENVIRONMENT CELL TEAM AT SITE

E Code	Employee Name	Designation	Contact Number	Responsibilities
ECO00277	Deepak Sharma	Store Incharge	+91 9899302480	Health factors(Hygiene)
ECO00911	Biswajit Mohapatra	Manager (Mechanical)	+91 9654989169	Safety factors
ECO00952	Kuldeep Singh	Manager Plant	+91 8505997944	Environmental factors

9.1.1 Record Keeping & Reporting

Record keeping and reporting of performance is an important management tool for ensuring sustainable environmental operation of the industry. Records should be maintained for regulatory, monitoring and operational issues. Typical record keeping particulars for the plant site is summarized in following table no. 9.1.

TABLE NO. 9.2 RECORD KEEPING PARTICULARS

Parameters	Particulars
Solid Waste Handling and Disposal	• Daily quantity of waste handling • No. of and weight of trucks
Regulatory Licenses (Environmental)	• Environmental Permits / Consents from SPCB / MoEF&CC • Copy of waste manifests as per requirement
Monitoring and Survey	• Records of all monitoring carried out as per the finalized monitoring protocol. • Date and time of the accident • Sequence of events leading to accident. • Chemical datasheet assessing effect of

	• accident on health and environment • Emergency measure taken • Step to prevent recurrence of such events
Other	• Log book of complaints • Employee environmental, health and safety records • Equipment inspection and calibration records, where applicable • Vehicle maintenance & inspection records

9.1.2 Awareness:

To lay down the procedure for identification of training needs and providing appropriate training to all Employees and contract employees to ensure effective implementation of EHS & Social management systems at all levels and functions. The organization shall do the necessary training need identification at level and functions.

- General awareness and employees roles and responsibilities in achieving conformance with policy, objective and targets
- Relevant EHS &Labour laws rules and regulations
- EHS & Social induction training for Policy goals and objectives
- Awareness on latest applicable SOP's and protocols related to environment, safety & health like fire safety mock drills, Kyoto Protocol, road safety week, etc.
- Applicable legislative requirements
- Requirements that are conditions of employment. Benefits of improved personal performance.
- The potential consequence of deviation from specified operating procedures.
- Emergency Preparedness and Response.
- Job Specific Training

- Communication and consultation, both internal & external.
- Awareness regarding Corrective & preventive actions of any accidents happen on site.
- Heavy Goods Vehicles holding areas to be provided for vehicles waiting to deliver loads at work sites so as to avoid queuing on other connecting roads.
- Installations of fire safety equipment's.

9.2 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION AND OPERATION PHASE

Although the impacts on the environment during the construction phase would be temporary in nature and are expected to culminate on completion of the construction activities, implementation of management plans for various environmental attributes will further reduce the impact in terms of its spread, duration and intensity.

TABLE-9.3 ENVIRONMENTAL MANAGEMENT DURING CONSTRUCTION PHASE

S.N.	Potential impacts	Mitigation measures
1.	Fugitive emission from construction activity and Remediation process for existing waste dump.	• Wet suppression will be applied to all inactive disturbed surface areas on a daily basis especially during dry and windy days. • Limited vehicular movement will be permitted on disturbed soils • Vehicle speeds on unpaved roads will be restricted 25 kmph; • Contractors will be required to maintain valid Pollution under Control certificates issued by Transport Department and proper maintenance records for their fleet; • Haul trucks will be covered with suitable covering material like tarpaulin sheets to prevent fugitive

		emissions during transportation of construction materials. • Herbal pesticides and Indigenous Tree & root Aroma Plantation © IECRS (ITRA) Plantation technique - Z shape will be used for odor control and management.
2.	Noise due to Construction activities (such as excavation, grading, erecting equipment, piling, etc)	• The construction areas to be provided with sheet barriers or temporary walls along the boundary close to any habitations; • Rubber padding to be provided in the construction machinery for vibration control; • Regular maintenance of its vehicles and repair of its equipment/ machinery will be undertaken;
3.	Potential run-off from site and percolation of used oil/ oil and grease generated from the vehicles. Contamination of surface and groundwater resources.	• Awareness on optimal water consumption will be provided to the labourers. • An impervious cover will be provided over the adjacent storm water drain to prevent the surface runoff carrying the construction waste materials/ other pollutants to enter the drain.
4.	Removal of flora at site due to clearing of vegetation	The area has devoid of dense vegetation only weeds & grasses are removed from the site. No vegetation to be removed from area outside the project site boundary. 33% Compensatory afforestation will be done in fixed area.
5.	Disruption of traffic and marginal increase in potential for traffic related	• Movement of traffic entering the site shall be properly managed to ensure minimum disturbance to community; • Dedicated entry and exit points to be provided

		within the Site.
6.	Occupational Health and Safety	• The construction staff and contractors involved in the construction activities will be trained on the necessary precaution and safety practices prior to commencement of construction activity; • All required Personal Protection Equipment will be used by the workers at site and their use to be supervised; • Proper signage will be provided in places of excavated areas; • Workers will be provided with required PPEs and first aid to be used at site;

TABLE 9.4 ENVIRONMENTAL MANAGEMENT PLAN IN OPERATIONAL PHASE

S.N.	Component	Potential impact identified	Suggested Management Plan
1.	Ambient Air Quality	Vehicular emissions Dust and particulates Emissions, Fly ash & Gas emission	❖ Internal roads will be concreted / asphalted to reduce dust emissions; ❖ All the trucks bringing waste to the site will be covered throughout their transportation route; ❖ Thick green belt will be provided along the internal roads and plant boundary which will limit the spread of dust and odour; ❖ Proper gas management plan. ❖ For control air emissions and fly ash Dry reactor, Activated carbon Scrubber, Bag

			filter will be installed. ❖ Post closure monitoring of ambient air quality at site should be undertaken as per the requirements of MSW Rules, 2016.
2.	Soil Quality	Contamination of soil due to Leachate. Spillage from vehicles and used oil from DG set	❖ Design parameters for facility already include impermeable concrete windrow pad, drainage network, leachate collection and treatment system. ❖ Ensure that the surface runoff from paved areas are collected in storm water drains and does not flow to landscaped areas; ❖ It is recommended that the closed landfill should have provisions for HDPE Liner beneath it to check leachate percolation into soil and ground water.
3.	Ambient Noise Quality	Potential increase in noise levels in adjoining areas due operating equipment's. Impact on avifaunal species due to increased noise	❖ Acoustic enclosures, rubber paddings and linings will be provided for all noise producing equipment's such as shredders, DG sets etc. ❖ Proper plantation will be done in barrier of project site. ❖ Proper maintenance of machineries such as diesel and exhausts silencers, lubrication of conveyer trolleys, etc.

			❖ Working hours of the workers employed in high noise areas will be rotated; ❖ Earplugs/muffs, or other hearing protective wear will be provided to those working very close to the noise generating machinery; ❖ Periodic monitoring of noise levels on site and at nearby receptors will be carried out to ensure compliance with Noise Pollution (Regulation & Control) Rules 2000.
4.	Water Resources and Quality	Fresh water demand of the Project. Inadequate management of Storm water. Leachate generation from windrows compost pads mixed waste storage pits and closed landfill.	❖ Recycling and reuse of leachate will be carried out to minimize fresh water requirement. ❖ Provisions to be made for rainwater harvesting from rooftop, paved areas and landscaping areas. ❖ Leachate from the waste tipping areas will be collected separately and conveyed via leachate collection drain up to leachate collection sump. ❖ Quality of groundwater should be monitored and analyzed against IS 10500 standards for drinking water prior to use.
5.	Traffic & Transport	Increase in traffic volume	❖ A proper traffic management plan will be implemented to mitigate adverse

			impacts, if any on existing traffic and transport scenario.
6.	Ecology	Disturbance to local birds and small mammals in the adjoining areas	❖ A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary and provide habitat to small birds and mammals; ❖ Native species and healthy seedlings will be planted filled with topsoil; ❖ Attempts will be made to ensure that all open spaces, where tree plantation may not be possible, will be covered with shrubs and grass to prevent erosion of topsoil.
7.	Socioeconomic aspect	Disturbance to community due to increased noise levels, odour, air emissions and traffic. More employment Opportunities Formalization of rag pickers Participatory role of Residents Improve aesthetics of area	❖ Good Waste Handling practices will be implemented which will greatly reduce foul smell and reduce impact from odours. ❖ Vehicles/ trucks moving through community roads will be covered and the operations will be restricted to day time. ❖ Maximum efforts will be made to provide job opportunities to local residents during construction and operation phase. ❖ Awareness campaigns to be

			organized emphasizing the need of sorting at source, waste collection and participatory role of residents in waste management in an area. ❖ Odor management and monitoring will be using Herbal pesticides and Indigenous Tree & root Aroma Plantation © IECRS (ITRA) Plantation technique - Z shape

Besides the above management measures for various environmental and social parameters, detailed management Plans have also been formulated for following:

9.3 LEACHATE MANAGEMENT PLAN

Leachate is the water-based complex liquid, comprising of innumerable organic and inorganic compounds, which percolates through waste heap and accumulates at the bottom. Leachate when escapes to nearby environment poses an enormous threat to the groundwater and surface water contamination hence making the process of Leachate Management exceptionally critical.

While the characteristic of leachate depends considerably on the waste deposit, age of the landfill, temperature and moisture content, it is significantly concentrated in terms of toxic chemicals and thus the treatment of leachate becomes crucial in preventing the high-risk contamination.

Leachate management follows the hierarchal procedure comprising of followings:

- Leachate Collection & Treatment: by incorporating proper drainage system to collect the leachate from the bottom and efficiently treating to comply with the standards before disposing the treated liquid waste into streams.

- Leachate Minimization: by re-circulating the collected leachate onto the composting heap.

Details of proposed Leachate Management System is furnished in chapter 2, section 2.7.2 of EIA/EMP report.

9.4 GREENBELT DEVELOPMENT PLAN

Greenbelt has been planned in the periphery of the proposed project site which along with the other planned green areas within the site, will cover about 33 % of the total project area. The closed landfill cover will also be provided with green vegetation. Details of proposed greenbelt development for the project are given below:

Total Green belt area	**40666 Sq. mt (33%)**
No of Rows	Three Rows
Plantation Type	Trees- APTI-ITRA
Total No. Trees Proposed	3000 No.
Shrubs	1000 No.
Odor management Species	*ITRA Plantation technique (Z-shape)
*Indigenous Tree & root Aroma Plantation © IECRS	

The development of a greenbelt will help in noise attenuation and also to arrest particulate pollution to a small extent. Plants serve as a sink for pollutants, act as a barrier to break the wind speed as well as allow the dust and other particulates to settle. The plant species suitable for greenbelt development need to be selected based on the following criteria:

- Fast growing, non-edible perennial plants.
- Ability to thrive on low-nutrient soil
- Thick canopy cover;
- Large leaf area index;
- High sink potential;
- Efficient in absorbing pollutants without significantly affecting their growth; and
- Suitable for the local seasons.

Post-Plantation Care

- Watering at least once a week during dry spells.
- Organic fertilizer and manure.
- Weeding thrice in the first year and twice a year, during the subsequent two years and soil working
- Plugging and mulching.
- Protection from pests.
- Pruning and thinning

PROPOSED PLANTATION- About 40666 Sqm areas will be covered under plantation which is full fill 33% of plantation. Proposed plantation species for greenbelt as per CPCB guidelines are given below-

TABLE NO-9.5 PROPOSED PLANTED SPECIES

S.No	Common Name	Botanical Name	Height	Sensitive/Tolerant			Evergreen/Deciduous.
				Dust	Odour	Noise	
1	Mango tree	*Mangifera indica*	15 m	√	×	×	Evergreen
2	Neem	*Azadirachta indica*	15-20 m	√	×	×	Evergreen
3	Shisham	*Dalbergia sissoo*	15-20 m	√	×	×	--
4	Karanj	*Pongamia pinnata*	15-25 m	√	×	×	Evergreen & Deciduous
5	Amaltas	*Cassta fistula*	10-12 m	√	×	×	Deciduous
6	Champa	*Plumeria alba*	1-7 m	√	√	√	--
7	Saptparni	*Alstonia*	10-15m	√	√	×	Evergreen
8	Gulmohar	*Delonix regia*	15m	√	√	×	Deciduous
Shrub Species							
9.	Paper flower	*Bougainvillea glabra*	8 m	√	×	√	Evergreen
10.	Gudhal	*Hibiscus rosa*	3 m	√	×	×	Evergreen

Greenbelt is initiated in the periphery of the in IMSWM project site, along with the other planned green areas within the site and will be continued as per above planning for proposed expansion of WTE. Following are the pictures for Greenbelt development at IMSWM site.

FIGURE NO. 9.1 PICTURE OF SITE SHOWING GREENBELT DEVELOPMENT AT PERIPHERY AND INSIDE THE PROJECT SITE

9.4 OCCUPATIONAL HEALTH & SAFETY MANAGEMENT PLAN

The Occupation Health & Safety Management Plan (OHSMP) is applicable for all project operations which have the potential to adversely affect the health and safety of construction workers, MSW facility operators and other labours.

The Occupation Health & Safety Management Plan (OHSMP) have been formulated to address the occupational health and safety related impacts that may arise from proposed project activities particularly during waste handling and segregation, waste unloading, processing and disposal.

Management Measures

- Providing workers with appropriate protective clothing, gloves, respiratory face masks and slip-resistant shoes for waste transport workers and hard-soled safety shoes for all workers.
- The workplace shall be equipped with fire detectors, alarm systems and fire-fighting equipment. The equipment shall be periodically inspected and maintained in good working condition.
- Providing adequate personnel facilities, including washing areas and areas to change clothes before and after work.
- All the employees shall be required to undergo a medical check-up before joining the facility.
- First aid facilities required to attend immediately for meeting emergency situations shall be made available at the facility.

Community Health & Safety Management Plan

The Community Health & Safety Management Plan shall be applicable construction as well as operation phase so as to minimize adverse impacts on health and safety of nearby community.

Management Measures

Efforts will be made for best housekeeping practices within the project site, so that no water get accumulated in small depressions or low lying areas or within any empty tanks, containers, tyres or debris , which can become breeding areas for mosquitoes. To minimize odour generation from the facility, maximum efforts will be put in to maintain aerobic conditions in the windrows to facilitate decomposing of biodegradable waste in oxygen rich environment, thereby minimizing chances of production of odorous gases like methane, ammonia and hydrogen sulphide. Regular monitoring of ambient air quality and noise levels will be undertaken in and around the facility.

9.5 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT

The below table give overall investment on the environmental safeguards and recurring expenditure for successful monitoring and implementation of control measures.

TABLE NO-9.6 BUDGETARY PROVISION FOR ENVIRONMENTAL MANAGEMENT FOR PROPOSED EXPANSION

Sr. No	Component	Description	Cumulative for Total Project of 25 MW	
			Capital cost In Lac.	Maintenance Cost. (Lac)
1.	Air Pollution Control	Flue Gas Cleaning System comprises of Scrubber & Bag filters	1500/-	200/-
2.	Water Pollution Control	LTP & ETP	800/-	50/-
3.	Environment Monitoring and management	Air Quality, Water and waste water quality, Noise level and Soil quality, laboratory	220/-	20/-
4.	Solid rejects Management	Landfill	300/-	10/-

5.	Green Belt	Plantation	50/-	6/-
Total			2870/-	286/-

As per the directions given in the MoEF&CC Office Memorandum, F.No. 22-65/2017-IA-III on 30th September 2020, all the proposed activities will be part of Environmental Management Plan instead of CER.

9.6 CORPORATE SOCIAL RESPONSIBILITY (CSR):

Municipal Corporation Gurugram (MCG) implements CSR is various ways by promoting local employment, greenery development and water facilities etc in villages adjacent to project site and also in Gurugram District.

The CSR activities will be practiced/implemented as per the Ministry of Corporate Affairs, Government of India. Following are few CSR activities were conducted by MCG, Haryana:

1. Development of Public Rainwater Harvesting in different places in Gurugram city
2. Plantation campaigns/activities in the city
3. Implementation of City Clean & Sanitisation - Swachh Survekshan 2020
4. Awareness advertises for COVID 19

FIGURE NO.9.2 PHOTOGRAPHS FOR THE CSR ACTIVITIES CONDUCTED BY MCG

Huda colony, sector 46, Gurugram

Sector 22A Park, Gurugram.

MCG workers assessing public Rainwater Harvesting Syestem in Sector 47 and Jal Vihar colony, Gurugram

Installation of Rain Water Harvesting Units

Plantation Drive in different places in the district by MCG

Gurugram City Clean & Sanitization Services – Swachh Survekshan 2020

Various Awareness advertises for COVID 19 – Pandemic

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CHAPTER – X

SUMMARY & CONCLUSION

10.1 INTRODUCTION

The proposed project is for expansion of waste to Energy (WTE) plant from 15 MW to 25 MW at Integrated Municipal Solid Waste Management Facility (IMSWM) of 2100 TPD capacity at Bandwari village, Gurugram, Haryana. The main objective of the proposed expansion is to collect and process 100% of MSW generated in the area limits and produce valuable compost & RDF for generating electricity using RDF based WTE and to dispose of the inerts through scientific process of Sanitary Landfilling (SLF).

The proposed expansion project of 25 MW WTE plant in IMSWM facility at Bandhwari is categorized under Item "1(d) Thermal Power Plants- Waste to Energy (WTE)" in the EIA Notification, dated September 14, 2006 and its subsequent amendments and will be treated as Category 'A' project for appraisal at MoEF&CC, New Delhi to obtain Environmental Clearance for the proposed project.

The nearest railway station is Faridabad at a distance of 13.7 km in East direction. Indira Gandhi International airport is the nearest airport at an aerial distance of 18.10 km in NNW direction. As recognize deficiencies/gaps in the present system and Municipal Corporation Gurugram (MCG) proposed a comprehensive plan for IMSWM including segregation, collection, transportation and regional/cluster approach for processing, waste to energy plant of capacity 25 MW & scientific disposal in sanitary landfill in compliance with the SWM Rules 2016 and all applicable rules and regulations. In short, the objective of the project is to introduce appropriate technologies for management of MSW and power generation using waste to energy plant so as to reduce and prevent the waste from causing pollution and health hazards. The EMP has been prepared with a view to ultimately ensure that the adverse impacts are minimized.

10.2 IDENTIFICATION OF PROJECT & PROJECT PROPONENT

Identification of project-

Gurugram is one of the fastest growing cities in India. Rapid development and habitation in the city is generating all kinds of waste, which is becoming a serious health and sanitation hazard for its residents. Also in Faridabad due to rapid urbanization huge amount of waste is generated every year. So management of waste is of utmost importance. The project seeks to improve and develop a socially and environmentally sustainable system of solid waste management which will reduce the associated environmental and public health risks. The proposed IMSWM-WTE expansion project has been designed based on population projections. Present waste quantity, based on average per capita waste generation, in the proposed service area (Gurugram-Faridabad Cluster) is estimated to be about 1165 for year 2015 TPD. Considering the population projection and the waste generation forecast, the total waste quantity in the year 2035 is estimated to be about 2100 TPD which will be processed & treated to produce compost and RDF- 1500 TPD for generating 25 MW of power using waste to energy plant.

Identification of project proponent

Applicant	Authorize signatory
Joint Commissioner - SBM Municipal Corporation Gurugram sbm@mcg.gov.in	Dheeraj Kumar

TABLE-10.1: SUMMARY OF THE PROJECT

Sr.No.	Particulars	Details
A.	**Nature of the Project**	Integrated Municipal Solid Waste Management (IMSWM) Processing Facility with proposed expansion of Waste to Energy (WTE) Plant from 15 MW to 25 MW capacity.
B.	**Size of the Project**	
	Existing & Proposed Capacity	Waste quantity: 1165 TPD in 2015, 1565 TPD in 2025 & estimated waste quantity in 2035 will be 2100 TPD (as per 2011 census) Existing Project Area - 30.5 Acres

<table>
<tr><th>Sr.No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Project Activity/ Components</th><th>As per EC awarded</th><th>Proposed expansion</th></tr>
<tr><td>Total capacity of facility</td><td>2100 TPD</td><td>NIL</td></tr>
<tr><td>RDF plant</td><td>1500 TPD</td><td>NIL</td></tr>
<tr><td>Composting</td><td>147 TPD</td><td>210 TPD</td></tr>
<tr><td>Area for SLF</td><td colspan="2">24680 Sqm</td></tr>
<tr><td>Waste to Energy (RDF based)</td><td>15 MW</td><td>25 MW</td></tr>
</table>

Therefore, the following are proposed for expansion in WTE plant:
• Proposed expansion to 25 MW
• Mechanical Grate type Boilers: 2 No. (750 TPD/each)
• Steam Turbine Generator: 1 no. 25 MW
• Bag Filters System</td></tr>
<tr><td>2.</td><td>Composting</td><td>210 TPD</td></tr>
<tr><td>3.</td><td>RDF Plant</td><td>1500 TPD</td></tr>
<tr><td>4.</td><td>Sanitary Landfill</td><td>Area: 24680 Sqm</td></tr>
<tr><td>5.</td><td>Waste to Energy (WTE) Plant</td><td>25 MW</td></tr>
<tr><td>6</td><td>Fuel Supply & Availability for Proposed WTE of 25 MW</td><td>Municipal Solid Waste (MSW) shall be processed to make RDF/Combustible material further to use as fuel for Power generation.</td></tr>
<tr><td>C</td><td colspan="2">Location Details</td></tr>
<tr><td>1.</td><td>Plot no./Kasra no.</td><td>46//5/26,15,16,17/1,24/1,24/2,25,
47//8,9,10,11,12,13,18,19,20,21,22,23,
48//1,2,9,10,11,49//3/3,4,5,7,8/1,13/2,14,15</td></tr>
<tr><td>2.</td><td>Latitude & Longitude of Project site</td><td>I. 28°24'14.89"N 77°10'16.86"E
J. 28°24'13.13"N 77°10'27.39"E
K. 28°24'01.35"N 77°10'18.83"E
L. 28°24'02.72"N 77°10'11.54"E</td></tr>
<tr><td>3.</td><td>Topo sheet No.</td><td>53H/3, 53H/7</td></tr>
<tr><td>4.</td><td>Village</td><td>Bandhwari</td></tr>
<tr><td>5.</td><td>Tehsil</td><td>Gurugram</td></tr>
<tr><td>6.</td><td>District</td><td>Gurugram</td></tr>
</table>

<table>
<tr><th>Sr.No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td>7.</td><td>State</td><td>Haryana</td></tr>
<tr><td>D</td><td colspan="2">Environmental Settings of the Area</td></tr>
<tr><td>1.</td><td>Ecological Sensitive Areas</td><td>Asola Wildlife Sanctuary boundary exists at 300 m in NE direction from the project site and is beyond Eco Sensitive Zone (ESZ) of Asola WLS which is 150 m at ID P-9 & P-10 points (nearest points to site) as per MoEF&CC notification no. 5.0.1911 (E) dated 31st May 2019 in reference of Asola Bhatti Wildlife Sanctuary.
NOC & Clarification letter regarding the same has been obtained.</td></tr>
<tr><td>2.</td><td>River / water body</td><td>
<table>
<tr><th>River/ water body</th><th>Distance</th><th>Direction</th></tr>
<tr><td>Jauhar Nala</td><td>1.14 km</td><td>SE</td></tr>
<tr><td>Lake Shail</td><td>2.25</td><td>SE</td></tr>
<tr><td>Water body near village Gothda Mohbtabad</td><td>3.73</td><td>SSE</td></tr>
<tr><td>Li Nala</td><td>3.72 km</td><td>NW</td></tr>
<tr><td>Sharpur Nala</td><td>5.92 km</td><td>NNE</td></tr>
<tr><td>Paliwala Nala</td><td>6.22 km</td><td>E</td></tr>
<tr><td>Harcliandpur Distributary</td><td>6.72 km</td><td>SE</td></tr>
<tr><td>Lake Niharika</td><td>7.81</td><td>E</td></tr>
<tr><td>Nekpur Miner</td><td>8.41 km</td><td>ESE</td></tr>
<tr><td>Bhiruya Nala</td><td>9.35 km</td><td>ENE</td></tr>
<tr><td>Fatehpur Miner</td><td>9.86 km</td><td>SSE</td></tr>
<tr><td>Barkhal Lack</td><td>9.70 km</td><td>E</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>Nearest Town / City</td><td>Gurugram- 6.44 Km; Faridabad – 9.67 Km</td></tr>
<tr><td>4.</td><td>Nearest Railway Station</td><td>Faridabad Railway Station at 13.7 km in East Direction</td></tr>
<tr><td>5.</td><td>Nearest Airport</td><td>Indira Gandhi International Airport at 18.10 km in NNW Direction. NOC from Airports Authority of India has been obtained through vide letter no. AAI/RHR/NR/ATM/NOC/2018/288/1517-1520 dated: 04.09.2018.</td></tr>
<tr><td>6.</td><td>State Boundary</td><td>Interstate Boundary of Haryana and Delhi lies at 0.98 km from the site</td></tr>
</table>

Sr.No.	Particulars	Details
7.	Seismic Zone	Zone – IV [as per IS 1893 (Part-I): 2002]
E	**Cost Details**	
1.	Total Project Cost	61700.92 Lakhs
F	**Requirements of the Project**	
1.	Water Requirement	Construction Phase: 8 -10 KLD Source: Municipal Corporation of Gurgaon Operation Phase: 792 KLD (for MSW Processing & WTE plant) + 12 KLD (for Domestic) Source: Nearby STP approved by GMDA and drinking water, separately through MCG approved water tankers. Approval from GMDA to receive 4 MLD reclaimed water from STP for the project operation was obtained Memo no. GMDA/S&S/2018/579 on 24.05.2018.
2.	Power Requirement	Construction Phase: 675 KW (backed up through 630 KVA DG set.) Operation Phase: auxiliary supply from proposed waste to energy plant (backup through 1500 KVA DG set)
3.	Manpower requirement	Construction Phase: Around 600 workers Operation Phase: 2100 (Including manpower required for Waste collection & Transportation)

10.3 NEED OF PROJECT

Solid waste management has been an issue of major concern since the last two decades. Even then, the current waste management systems are collapsing under the pressures mainly caused by unmitigated urban growth. The solutions to the waste management adopted in developed countries have either little or no relevance to local conditions in developing countries particularly in India. With the onset of the population explosion in Haryana, the quantum of MSW generation has also considerably increased. The present scene in waste management, displays an array of problems, including low collection coverage, irregular collection services, open dumping, burning and the handling and

control of informal waste picking or scavenging activities. The safe and reliable long-term disposal of solid waste is a vital component of integrated waste management.

In times gone by, landfills have been the most common, environmentally and economically acceptable method of disposal of solid waste. Even with the implementation of recycling and waste-to-energy treatment to reduce it, disposal onto landfills remains a significant component of an integrated waste management strategy.

Municipal Solid Wastes (Management and Handling) Rules 2000 and amendment 2016 has made MSW management the responsibility of urban local bodies (in particular, municipal authorities), which includes the segregation of waste at the source for 'cleaner composting' and 'recycling'. The MSW management and handling notification makes it obligatory for the municipalities to restrict land filling to non-biodegradable inert waste, and other wastes that are not suitable either for recycling or for biological processing. With this in mind, the guidelines also prohibit to dump the biodegradable component of the waste into the landfills.

The proposed project is an expansion of waste to energy plant from 15 MW to 25 MW in Integrated Municipal Solid Waste Management (IMSWM) facility at Bandhwari Village is itself is a project for environmental and social betterment of Gurugram District of Haryana.

10.4 LAND DETAILS

The proposed IMSWM – WTE site is situated in Village Bandhwari, Tehsil & District: Gurugram in Haryana. The total project land belongs to MCG and is designated for proposed IMSWM-WTE plant. The total project site area is 30.5 acres which includes MSW processing plant of 2100 TPD, SLF & 25 MW capacity WTE plant. Following is the land breakup details of proposed expanded project with 25 MW WTE plant.

TABLE 10.2: LAND USES BREAK UP OF PROPOSED FACILITY

Facility	Area (in sq m)	Area (in acres)	% of total land
Waste to Energy Plant Area	26580	6.56	21.57
MSW processing area	13590	3.35	11.03
Roads/ Amenities	11080	2.7	9

Sanitary Landfill	24680	6.0	20
Green Belt	40666	10.0	33
Drain/Sump	6634	1.6	5.4
Total	**123230**	**30.5**	**100**

10.5DESCRIPTION OF PROPOSED SITE FACILITY:-

Water Requirement

Construction Phase- During construction phase water will be require about 8-10 KLD which will be brought from municipal corporation Gurugram.

Operational Phase- Total water requirement in the project during operation phase the total supply water for process and power production in the whole plant is 33 m3/h (792 KLD) which will be sourced from nearby STP approved by GMDA (Memo no. GMDA/S&S/2018/579 on 24.05.2018) and required drinking water of 0.5 m3/h i.e 12 KLD will be sourced separately through MCG approved water tankers.

Power requirement

Power up to 675 KW will be sourced from local grid during construction phase and will be backed up through 630 KVA DG set. During operation phase auxiliary supply from proposed waste to energy plant of 25 MW will cater the need of the MSW processing facility and same shall again be backed through Grid supply & 1500 KVA DG set shall be used as the emergency power supply for the project.

Manpower requirement: - During construction phase around 600 workers will be required including contractual & non contractual manpower (i.e. Officers, skilled workers & semi-skilled workers).

During operation phase 2100 workers (including manpower required for waste collection & transportation) will be required, This manpower nos. consists of contractual & non contractual workers (i.e. Officers, skilled workers, Semi-skilled, EHS officers, Plant Staff etc.). Majority of workers will be hired locally.

10.6 BASELINE MONITORING STATUS

The generation of primary data as well as collection of secondary data and information from the site and surroundings was carried out during winter season i.e. study period (Oct 2020 to Dec 2020). Map showing monitoring location (Air, Water Soil, Noise, Ecology & Biodiversity & Socio-economics) is shown in figures in chapter 3 of EIA/EMP report.

- Micrometeorological
- Air Environment
- Water Environment (surface and ground water)
- Noise Environment
- Soil & Land Environment
- Ecology & Biodiversity (Biological) Environment
- Socio- Economic Environment

2.6.1 MICROMETEROLOGICAL

The micrometeorological data recorded in the study region as well as surface meteorological data procured from IMD corresponding to nearest available observatories are appropriately used in this study and wind row diagram was produced for the study period. During the winter season, the winds were predominantly recorded from NW closely followed by W. Calm condition prevailed for 0.27% of the total time and the average wind speed for the season was observed to be 3.40 m/s.

10.6.2 WATER ENVIRONMENT

In order to conduct EIA Studies, baseline data pertaining to water environment of the proposed expansion project was carried out evaluating the basic characteristics, drainage pattern, and hydrology. Water Environment of the area has been studied by locating ground water sources.

Total 8 no. of ground water samples and 3 no. of surface water were collected and analysed during the study. There is only one ground water source exists in project site. Aquifers which may be tapped by Bore wells, dug wells, tube wells, hand pumps etc.

Conclusion:

- During study period the pH in the ground water samples was varying from 6.58 to 7.27. The pH of all samples was falling within the acceptable limit.
- The total dissolved solids in groundwater are varying from 464 to 2988 mg/l. One sample is falling within acceptable limit and two samples are falling above permissible limit.
- The Chloride levels in the ground water samples collected in the study area were ranging from 48 to 1085 mg/l. Two samples are falling above permissible limit. Rest all samples are within acceptable limit.
- In the ground water samples collected from the study area, the hardness is varying from 276 to 1120 mg/l. All samples are falling above the acceptable limit and two samples are falling above the permissible limits.
- Fluoride content was varying from 0.3 mg/L – 0.7 mg/L which is in acceptable & permissible limit.
- Observations of all the 3 surface water samples were analyzed and are meeting the Class 'A' norms as per IS: 2296-1992.

10.6.2 AIR ENVIRONMENT

PM_{10} level in the study area:

PM_{10} value recorded during the study period ranges between 154.42 to 354.37 µg/m3.

$PM_{2.5}$ level in the study area:

$PM_{2.5}$ value recorded during the study period ranges between 98.04 to 144.23 µg/m3.

SO_2 level in the study area:-

SO_2 value recorded during the study period ranges between 12.69 to 19.99 µg/m3.

NO_X level in the study area:

NO_X value recorded during the study period ranges between 27.29 to 74.09 µg/m3.

CO level in the study area:

The 98th Percentile of CO recorded within the study area was in the range of 1.09 to 2.06 mg/m3..

Ozone level:

The 98th percentile of ozone recorded within the study area was in the range of 8.81 to 49.13 µg/m3.

Ammonia

The 98th percentile of NH3 recorded within the study area was in the range of 24.81 to 69.92 µg/m3.

Conclusion

From the baseline monitoring result, it is observed that the monitored parameters are within the permissible limits as per NAAQS, 2009 during the study period except PM_{10} & $PM_{2.5}$ which was monitored very high due to the continuous practice of stubbles burning in nearby villages in Haryana as well as Delhi.

10.6.3 NOISE ENVIRONMENT

The day noise levels have been monitored during 6.00 am to 10.00 pm and night noise levels during 10.00 pm to 6.00 am, at all the 8 locations covered in 10 km radius of the study area.

Day time Noise Levels (Leq day)

In the study area, the day equivalents during the study period are range between 46.6 to 56.1dB (A),

Night time Noise Levels (Leq night)

The night time (Leq night) Noise levels are observed to be in the range of 35.2 to 40.6dB (A) in study area.

From the results it can be seen that the day equivalents and the Night equivalents were within the Ambient Noise standards of industrial & residential as per the Noise Pollution (Regulation & Control) Rules, 2000.

10.6.4 BIOLOGICAL ENVIRONMENT

The biological study of the area has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment. Asola Wildlife Sanctuary is situated to 300 m NE direction from the project site.

NOC from the Principal Chief Conservator of Forest and Chief Wildlife Warden, Haryana was obtained vide letter no. 992 on dated: 09/07/19 certifying that the project is outside the defined Eco-sensitive zone of the Asola Bhatti Wildlife Sanctuary as per Notification dated: 31.05.2019. Hence, clearance from NBWL is not applicable for the project. A detailed site specific conservation plan & wildlife management plan was prepared and approved by Principal Chief Conservator of Forest & Chief Wildlife Warden, Haryana vide letter no. 992 dated: 09/07/19.

10.6.5 SOCIO- ECONOMIC ENVIRONMENT

Total population of the study area is 153342 persons. Out of which 82571 (53.8%) are male and 70771 (46.2%) are female. SC total population is 21848 out of which 11656 (53.4%) are male and 10192 (46.6%) are female.

Literacy Rate is the amount of people in a country with the ability to read and write. The analysis of the literacy levels is done in the study area. Literacy in any region is key for socio-economic progress and the Indian literacy rate grew to 74.04% in 2011 from 12% at the end of British rule in 1947. Although this was a greater than six fold improvement, the level is well below the world average literacy rate of 84% and of all nations.

10.7 ENVIRONMENT MONITORING PLAN

The major construction activities involved in setting up the expansion unit are construction of sheds for treatment units, stores, etc. major components in the proposed plant are landfill, waste to energy plant, diesel generator, FGCS, LTP cathode ray tube cutter and other civil, mechanical and electrical equipment. The

construction activities require preparation of site, remediation of existing old dump, mobilization of construction material and equipment. The construction activities are expected to last for few months.

During construction phase of landfill and WTE at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers, leachate collection system, FGCS, storm water management system, gas vent systems, etc.

TABLE 10.3 ENVIRONMENTAL MEASURES DURING OPERATION PHASE

S.No	Potential Impact	Detailed Action to be Followed as per EMP	Parameters for Monitoring	Frequency of Monitoring
9)	Air Emissions	Stack emissions from waste to energy plant	As per CTE conditions- Operating hours, Temperature, Pressure, TOC of residues, LOI of residues, Stack temp, CO, PM, HCL, HF, SO_2, NOx, TOC, mercury, heavy metals, dioxins & furans.	As per CTE norms given by SPCB or EC norms given by MoEF&CC and CPCB protocol.
		Gas quality from landfill areas	VOC, H_2S	
		Stack emissions from DG sets	As per CTE conditions PM, SO_2, NO_x	
		AAQ within the Project premises.	As per CTE conditions / NAAQ Standards	

		All vehicles to be PUC Certificate.	Vehicle logs to be maintained	
		Meteorological data	Wind speed, direction, temp., relative Humidity and rainfall.	
10)	Noise	Noise generated from operations to be monitored	Spot noise level recording	Periodic during operation phase Once in month by third party
11)	Wastewater Discharge (leachate)	Compliance to wastewater discharge standards	pH, TSS, TDS, BOD, COD and Oil & grease (heavy metals if required)	Daily at regular intervals Once in a month by third party
12)	Solid waste/Hazardous Waste	Check compliance to SWM rules	Quality & quantity monitoring	Periodically / CPCB norms.
13)	Ground Water Quality	Monitoring ground water quality, through piezometers	As per CPCB guidelines	Periodically & as Per CPCB norms.
14)	Flora and Fauna	Vegetation, greenbelt / green cover development	No. of plants, species	Once a year
15)	Soil quality	Checking & Maintenance of good soil quality around	Physico-chemical parameters and Metals.	Once a year
16)	Health	Employees and migrant	All relevant	Regular check-ups as

		labour health check ups	parameters (BP, HIV, Chest X-ray, Eye vision, etc.) and HIV for workers	per Factories act.

10.8 RISK ANALYSIS

The principal objective of the risk assessment study is to identify and quantify the major hazards and the risk associated with various operations of the proposed project, which may lead to emergency consequences (disasters) affecting the public safety and health.

All necessary measures to minimize the risk due to the proposed project will be taken during design stage and also during operation period viz. fire & safety control measures, Emergency preparedness plan, disaster management plan, etc.

10.9. PROJECT BENEFITS

The proposed project will have direct and indirect economic benefits in form of employment, development of ancillaries, establishment of service facilities, development of telecom and transportation facilities. The production of compost shall also enhance the crop productivity and improvement in the soil texture and enhancement of soil nutrients The compost produced from the composting pads and vermin composting unit can be used as soil conditioner that improve soil quality. This compost has the ability to help regenerate poor soil by increasing nutrient content in soil and retain moisture.

The following benefits are being envisioned:-

- Use of compost produced as manure to the crops.
- Generation of revenue through the sale of compost produced from the MSW processing and disposal facility.

10.10. Environment Management Plan

The Environmental Management Plan (EMP) is required to ensure sustainable development in the area of the proposed project site. Hence, it needs proper Environmental Management Plan (EMP) to meet these objectives. The purpose of the Environmental Management Plan is to minimize the potential environmental impacts from the project and to mitigate the adverse impacts. Details of Environment Management Plan are given below-

TABLE 10.4 MITIGATION MEASURE PROPOSED DURING OPERATION PERIOD

S.N.	Component	Potential impact identified	Suggested Management Plan
1.	Ambient Air Quality	Vehicular emissions Dust and particulates Emissions Gas emission.	❖ Internal roads will be concreted / asphalted to reduce dust emissions; ❖ All the trucks bringing waste to the site will be covered throughout their transportation route; ❖ Thick green belt will be provided along the internal roads and plant boundary which will limit the spread of dust and odour; ❖ Proper gas management plan. ❖ For control air emission Dry reactor, Activated carbon Scrubber, Bag filter will be installed. ❖ Post closure monitoring of ambient air quality at site should be undertaken as per the requirements of MSW Rules, 2016.
2.	Soil Quality	Contamination of soil due to Leachate. Spillage from vehicles	❖ Design parameters for facility already include impermeable concrete windrow pad, drainage network,

		and used oil from DG set	leachate collection and treatment system. ❖ Ensure that the surface runoff from paved areas are collected in storm water drains and does not flow to landscaped areas; ❖ It is recommended that the closed landfill should have provisions for HDPE Liner beneath it to check leachate percolation into soil and ground water.
3.	Ambient Noise Quality	Potential increase in noise levels in adjoining areas due operating equipment's. Impact on avifaunal species due to increased noise	❖ Acoustic enclosures, rubber paddings and linings will be provided for all noise producing equipment's such as shredders, DG sets etc. ❖ Proper plantation will be done in barrier of project site. ❖ Proper maintenance of machineries such as diesel and exhausts silencers, lubrication of conveyer trolleys, etc. ❖ Working hours of the workers employed in high noise areas will be rotated; ❖ Earplugs/muffs, or other hearing protective wear will be provided to those working very close to the noise generating machinery; ❖ Periodic monitoring of noise levels on site and at nearby receptors will be

			carried out to ensure compliance with Noise Pollution (Regulation & Control) Rules 2000.
4.	Water Resources and Quality	Fresh water demand of the Project. Inadequate management of Storm water. Leachate generation from windrows compost pads, mixed waste storage pits and closed landfill.	❖ Recycling and reuse of leachate will be carried out to minimize fresh water requirement. ❖ Provisions to be made for rainwater harvesting from rooftop, paved areas and landscaping areas. ❖ Leachate from the waste tipping areas will be collected separately and conveyed via leachate collection drain up to leachate collection sump ❖ Quality of groundwater should be monitored and analyzed against IS 10500standards for drinking water prior to use.
5.	Traffic & Transport	Increase in traffic volume	❖ A proper traffic management plan will be implemented to mitigate adverse impacts, if any on existing traffic and transport scenario.
6.	Ecology	Disturbance to local birds and small mammals in the adjoining areas.	❖ A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary and provide habitat to small birds and mammals; ❖ Native species and healthy seedlings

			will be planted filled with topsoil; ❖ Attempts will be made to ensure that all open spaces, where tree plantation may not be possible, will be covered with shrubs and grass to prevent erosion of topsoil.
7.	Socioeconomic aspect	Disturbance to community due to increased noise levels, odour, air emissions and traffic. More employment Opportunities Formalization of rag pickers Participatory role of Residents Improve aesthetics of area	❖ Good Waste Handling practices will be implemented which will greatly reduce foul smell and reduce impact from odours. ❖ Vehicles/ trucks moving through community roads will be covered and the operations will be restricted to day time. ❖ Maximum efforts will be made to provide job opportunities to local residents during construction and operation phase. ❖ Awareness campaigns to be organized emphasizing the need of sorting at source, waste collection and participatory role of residents in waste management in an area.

10.11. Conclusion

All possible environment aspects have been adequately assessed and necessary control measures have been formulated to meet statutory requirements. Thus implementing the proposed project will not have any appreciable negative impacts. Moreover, solid waste will be converted into usable form and only inerts would be sent for disposal at landfill site.

Development of this project has certain beneficial impact /effects in terms of providing the employment opportunities that the same will create during the course of its constructional phase as well as during operational phase of the project. Thus, it can be concluded that with the judicious and proper implementation of the pollution control and mitigation measures, the proposed expansion project will be beneficial to the society and will help reduce the pollution level.

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CHAPTER – XI

DISCLOSURE OF CONSULTANT

Fulgro Environmental & Engineering Services (I) Pvt. Ltd. (FEES) is one of the leading Environmental and Engineering Consultancy in India accredited and approved in 16 sectors by QCI-NABET. We works in the field of environmental engineering, natural resource management, mining, earth sciences, waste water management, land-use, topographical surveys etc. with a vision of supporting clean and green environment with a sustainable development. We believe it is a privilege to work in the field of environmental consulting so as to help achieving sustainable environment. We aim to fulfill client expectations and excellent service delivery with quality.

S. No.	S. No. as per NABET	Name of Sector	Category	Sector No. (MoEF & CC Notification dt. September 14,2006 & Amendments)
I.	1	Mining of minerals including opencast / underground mining	"A"	1 (a) (i)
II.	3	River Valley Projects	"B"	1 (c)
III.	4	Thermal Power Plants	"A"	1 (d)
IV.	8	Metallurgical Industries (ferrous & non-ferrous)	"B"	3 (a)
V.	9	Cement Plants	"A"	3 (b)
VI.	17	Pesticides industry and pesticide specific intermediates (excluding formulations)	"A"	5 (b)
VII.	20	Petrochemical based processing (processes other than cracking & reformation and not covered under the complexes)	"A"	5 (e)
VIII.	21	Synthetic organic chemicals industry (dyes & dye intermediates; bulk drugs and intermediates excluding drug formulations; synthetic rubbers; basic organic chemicals, other synthetic organic chemicals and chemical intermediates)	"A"	5 (f)

IX.	27	Oil & gas transportation pipeline (crude & refinery/petrochemical products), Passing through national parks/ sanctuaries/ coral reefs/ecologically sensitive area including LNG terminal	"A"	6 (a)
X.	28	Isolated storage & handling of hazardous chemicals (As per threshold planning quantity indicated in column 3 of Schedule 2 & 3 of MSIHC Rules 1989 amended 2000)	"B"	6 (b)
XI.	34	Highways	"A"	7 (f)
XII.	35	Aerial Ropeways	"B"	7 (g)
XIII.	36	Common Effluent Treatment Plants (CETPs)	"B"	7 (h)
XIV.	37	Common Municipal Solid Waste Management Facility (CMSWMF)	"B"	7 (i)
XV.	38	Building and construction projects	"B"	8 (a)
XVI.	39	Townships and Area development projects	B	8 (b)

We provide technically feasible and economically viable environmental services which will satisfy customer's requirement as well as statutory and regulatory requirements with the team of qualified & competent personnel. We shall also improve continually in all processes of QMS by providing training to all employees, reviewing performance regularly. We shall communicate our policy with our customers and vendors to achieve our objectives."

Annexures

ANNEXURE-I

COPY OF EC LETTER FOR IMSWM – WTE 15 MW

F.No.10-74/2016-IA.III
Government of India
Ministry of Environment, Forest and Climate Change
(IA.III - Section)

Indira Paryavaran Bhawan,
JorBagh Road, New Delhi - 110003
Date: 1st November, 2019

To,

The Assistant Nodal Officer
M/s Gurgaon Municipal Corporation
Directorate of Urban Bodies
Bays No. 11-14, Sector - 4, Gurugram (Haryana)

Subject: Integrated Solid Waste Processing Facility at Bandhwari Village, Gurgaon District, Haryana by M/s Gurgaon Municipal Corporation - Environmental Clearance - regarding.

Sir,

This has reference to your online proposal No.IA/HR/MIS/100246/2016 dated 26.03.2019 submitted to this Ministry for grant of Environmental Clearance (EC) in terms of the provisions of the Environment Impact Assessment (EIA) Notification, 2006 under the Environment (Protection) Act, 1986.

2. The proposal for grant of environmental clearance to the project "Integrated Solid Waste Processing Facility at Bandhwari Village, Gurgaon District, Haryana by M/s Gurgaon Municipal Corporation was considered by the Expert Appraisal Committee (Infra-2) in its 40th meeting held on 23.04.2019 and 43rd meeting held during 20-22 August, 2019. The details of the project, as per the documents submitted by the project proponent, and also as informed during the above meeting are as under:

(i) The proposed MSW disposal site is situated in Village Bandhwari, Tehsil and District Gurugram in Haryana. The nearest railway station is Faridabad at a distance of 13.7 km in East direction. Indira Gandhi International airport is the nearest airport at an aerial distance of 18.10 km in NNW direction'

(ii) The proposed project is categorized under Item "7(i) Common Municipal Solid Waste Management Facility (CMSWMF)" in the EIA Notification, dated 14th September, 2006 and its amendments. The project falls under interstate boundary of Haryana and Delhi which is distance about 0.98 km from project site so the proposed project falls under Category 'A', and require appraisal at MoEF&CC.

(iii) Expected Waste Quantity -1165 TPD in 2015; 1565 TPD by 2025 and 2100 TPD by 2035.

a. Composting- 147 TPD
b. Sanitary Landfill Design Life of Landfill is 20 Years
c. Power Plant - 15 MW

(iv) Terms of Reference was granted by MoEFCC vide letter F.No. 10-74/2016-IA.III dated 27.03.2017 and subsequent amendment in ToR was granted on 05.03.2019.

(v) Asola Wildlife Sanctuary is within 5.82 km NE direction from the project site.

(vi) During construction phase water requirement will be about 8-10 KLD which will be brought from Municipal Corporation of Gurugram. During operational phase total water requirement in the project will be about 837 KLD which will meet from nearby STP at Behrampur by Gurugram Metropolitan Development Authority.

(vii) Power up to 500 KW will be sourced from local grid during construction phase and will be backed up through 1 D.G sets of 630 KVA. During operation phase auxiliary

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supply from proposed power plant (15 MW) will cater the need of the MSW processing facility and same shall again be backed through Grid supply & DG set.

(viii) Greenbelt has been planned in the periphery of the proposed project site which along with the other planned green areas within the site, will cover about 33% of the total project area

(ix) The generation of primary data as well as collection of secondary data and information from the site and surroundings was carried out during winter season i.e. December, 2016 to February, 2017. One-month additional study was done in February, 2019.

(x) Public Hearing was conducted by Haryana State Pollution Control Board Gurugram on 21st March, 2018 at Project Site, Village Bandhwari, District Gurugram, Haryana.

(xi) Employment potential: During construction phase - 500 persons will be employed. During operational phase - 2000 on site (About 1900 temporary employees will be hired for primary collection, transportation and miscellaneous jobs

(xii) Estimated Project Cost is Rs. 330.48 Crores.

(xiii) Benefits of the project: Employment Potential, Benefit to the Urban Local Body, Organized Collection of MSW and Improvement in Social &Physical Infrastructure.

3. The project/activity is covered under category B of item 7(i) Common Municipal Solid Waste Management Facility (CMSWMF)' of the Schedule to the EIA Notification, 2006 and its amendments, and requires appraisal at State Level. However, due to applicability of General Condition i.e. Interstate Boundary of Haryana and Delhi is at distance about 0.98 km from the site, the project is appraised at Central level by sectoral EAC.

4. The proposal was earlier considered by EAC in its 40th meeting held on 23.04.2019. The Committee deliberated upon the issues raised during the Public Hearing/Public Consultation meeting conducted by the Haryana State Pollution Control Board on 21.03.2018. The issues were raised regarding air pollution, health issues of the local residents and ground water pollution by the proposed plantetc. The Committee noted that issues have satisfactorily been responded by the project proponent and incorporated in the final EIA-EMP report. The Committee also noted that Asola Wildlife Sanctuary is situated at 5.82 km NE direction from the project site. The EAC was informed that Eco Sensitive Zone of Asola Wildlife Sanctuary has not been notified in the State of Haryana and hence NBWL clearance will be required for the project. Also the project proponent has not applied for the NBWL clearance. Accordingly, the Committee asked the project proponent to submit the status of clearance from National Board for Wild Life (NBWL), revised Leachate Treatment Scheme (Plan) for the proposed project and revised water balance.

5. Project Proponent has submitted the additional information on Ministry's website on 10.07.2019. Accordingly, proposal was re-considered by EAC in its 43rd meeting held during 20-22 August, 2019. During deliberation the project proponent that the Municipal Corporation, Gurugram is leading Urban Local Body for "Integrated Solid Waste Management Processing Facility of Capacity 2100 TPD" at Bandhwari, Gurugram for Municipal Corporation, Gurugram and Faridabad. The proposed site is situated at a distance of more than 300 meters from the boundary points of Asola Bhatti Wildlife Sanctuary (MoEF&CC Notification No. 5.0. 2996 (E) dated 11th September 2017) and is beyond Eco Sensitive Zone of Asola Bhatti Wildlife Sanctuary which is 100 meters at ID Point P-9 & P-10 (nearest points to proposed site) (refer MoEF&CC Notification No. 5.0. 1911 (E) dated 31st May 2019). The project proponent also submitted a letter No. 992 dated 09.04.2019 issued by Forest & Wildlife Department, Government of Haryana stating that proposed site is situated at a distance of 27.5 km from boundary of Sultanpur National Park.

6. The EAC, based on the information submitted and clarifications provided by the Project Proponent and detailed discussions held on all the issues, recommended the project for grant of environmental clearance with stipulated specific conditions along with other Standard EC Conditions as specified by the Ministry vide OM dated 4th January, 2019 for the said project/activity, while considering for accord of Environmental Clearance. As per recommendations of the EAC, the Ministry of Environment, Forest and Climate Change hereby accords Environmental Clearance to the project "Integrated Solid Waste Processing Facility at Bandhwari Village, Gurgaon District, Haryana by M/s Gurgaon Municipal Corporation under the provisions of the EIA Notification, 2006 and amendments/circulars issued thereon, and subject to the specific and general conditions as under: -

A. Specific Conditions:

(i) Consent to Establish/Operate for the project shall be obtained from the State Pollution Control Board as required under the Air (Prevention and Control of Pollution) Act, 1981 and the Water (Prevention and Control of Pollution) Act, 1974.

(ii) Green Belt along the periphery in 3 tier. The landscape planning should include plantation of native species. The species with heavy foliage, broad leaves and wide canopy cover are desirable. Water intensive and/or invasive species should not be used for landscaping.

(iii) Ground water monitoring for Physico-Chemical parameters to be carried out and record maintained by providing piezometric wells along the flow channel (up and down).

(iv) Leachates to be collected and utilized within project after proper treatment.

(v) Environmental Monitoring Programme shall be implemented as per the EIA report and guidelines prescribed by CPCB for hazardous waste facilities. Periodical ground water/soil monitoring to check the contamination in and around the site shall be carried out.

(vi) The Company shall review the unit operations provided for the treatment of effluents, specially the sequencing of MEE after tertiary treatment, the source of permeate when no R.O. is recommended and the treatment of MEE condensate. The scheme for treatment of effluents shall be as permitted by the Pollution Control Board/Committee under the provisions of consent to establish.

(vii) On line real time continuous monitoring facilities shall be provided as per the CPCB or State Board Directions.

(viii) Project Proponent shall develop green belt, as committed. At least 10 m thick greenbelt shall be developed in the periphery of sanitary landfill facility.

(ix) Pre-medical check-up to be carried out on workers at the time of employment and regular medical record to be maintained.

(x) Emergency plan shall be drawn in consultation with SPCB/CPCB and implemented in order to minimize the hazards to human health or environment from fires, explosion or any unplanned sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil or surface water.

B. Standard Conditions:

I. Statutory compliance:

i. The project proponent shall obtain forest clearance under the provisions of Forest (Conservation) Act, 1980, in case of the diversion of forest land for non-forest purpose involved in the project.

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ii. The project proponent shall obtain clearance from the National Board for Wildlife, if applicable.

iii. The project proponent shall prepare a Site-Specific Conservation Plan & Wildlife Management Plan and approved by the Chief Wildlife Warden. The recommendations of the approved Site-Specific Conservation Plan / Wildlife Management Plan shall be implemented in consultation with the State Forest Department. The implementation report shall be furnished along with the six-monthly compliance report (in case of the presence of Schedule-I species in the study area)

iv. The project proponent shall obtain the necessary permission from the Central Ground Water Authority, in case of drawl of ground water / from the competent authority concerned in case of drawl of surface water required for the project.

v. A certificate of adequacy of available power from the agency supplying power to the project along with the load allowed for the project should be obtained.

vi. All other statutory clearances such as the approvals for storage of diesel from Chief Controller of Explosives, Fire Department, Civil Aviation Department shall be obtained, as applicable by project proponents from the respective competent authorities.

II. Air quality monitoring and preservation:

i. The project proponent shall install 24x7 continuous emission monitoring system at process stacks to monitor stack emission with respect to standards prescribed in Environment (Protection) Rules 1986 and connected to SPCB and CPCB online servers and calibrate these systems from time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories. (for projects involving incineration).

ii. As proposed, air pollution control device viz. gas quencher; treatment with mixture of hydrated lime and activated powder for adsorption of partial acidity and VOCs (if any); bagfilter/ESP for removal of particulate matter; venturi scrubber followed by packed bed scrubber with caustic circulation to neutralize the acidic vapours in flue gas; and demister column for arresting water carry over will be provided to the incinerator. Online pollutant monitoring shall be provided as per CPCB guidelines for monitoring particulate matter, SO_2, NOx and CO from the incinerator stack. The periodical monitoring of Dioxins and Furans in the Stack emissions shall be carried out.

iii. Analysis of Dioxins and Furans shall be done through CSIR-National Institute for Interdisciplinary Science and Technology (NIIST), Thiruvananthapuram or equivalent NABL Accredited laboratory.

iv. Incinerator shall be designed as per CPCB guidelines. Energy shall be recovered from incinerator.

v. Gas generated in the Land fill should be properly collected, monitored and flared.

vi. The project proponent shall install system to carryout Ambient Air Quality monitoring for common/criterion parameters relevant to the main pollutants released (e.g. PM_{10} and $PM_{2.5}$ in reference to PM emission, and SO_2 and NOx in reference to SO_2 and NOx emissions) within and outside the project area at least at four locations (one within the project area and three outside the project area), covering upwind and downwind directions.

III. Water quality monitoring and preservation:

i. The project proponent shall install continuous effluent monitoring system with respect to standards prescribed in Environment (Protection) Rules 1986 and connected to

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SPCB and CPCB online servers and calibrate these systems from time to time according to equipment supplier specification through labs recognized under Environment (Protection) Act, 1986 or NABL accredited laboratories.

ii. Sufficient number of Piezometer wells shall be installed in and around the project site to monitor the ground water quality in consultation with the State Pollution Control Board / CPCB. Trend analysis of ground water quality shall be carried out each season and information shall be submitted to the SPCB and the Regional Office of MoEF&CC.

iii. The depth of the land fill site shall be decided based on the ground water table at the site.

iv. Rain water runoff from the landfill area and other hazardous waste management area shall be collected and treated in the effluent treatment plant.

v. Total fresh water use shall not exceed the proposed requirement as provided in the project details. Prior permission from competent authority shall be obtained for use of fresh water.

vi. The Company shall ensure proper handling of all spillages by introducing spill control procedures for various chemicals.

vii. All leachates arising from premises should be collected and treated in the ETP followed by RO. RO rejects shall be evaporated in MEE. Toxicity Characteristic Leaching Procedure (TCLP) test to be performed on leachates.

viii. Scrubber water, leachate water or wheel wash effluent shall be treated in the effluent treatment plant followed by RO to achieve zero liquid discharge.

ix. Sewage Treatment Plant shall be provided to treat the wastewater generated from the project. Treated water shall be reused within the project.

x. A certificate from the competent authority for discharging treated effluent/ untreated effluents into the Public sewer/ disposal/drainage systems along with the final disposal point should be obtained.

IV. Waste management:

i. No non-hazardous wastes, as defined under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, shall be handled in the premises.

ii. The solid wastes shall be segregated, managed and disposed as per the norms of the Solid Waste Management Rules, 2016.

iii. Any wastes from construction and demolition activities related thereto shall be managed so as to strictly conform to the Construction and Demolition Waste Management Rules, 2016.

iv. A certificate from the competent authority handling municipal solid wastes should be obtained, indicating the existing civic capacities of handling and their adequacy to cater to the M.S.W. generated from project.

V. Transportation:

i. Project should ensure that the site is properly cordoned off from general movement and no unauthorized person or goods permitted to enter the premises. Necessary security provision should be made as a condition in the Authorization under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 to prevent unwanted access.

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ii. Traffic congestion near the entry and exit points from the roads adjoining the project site shall be avoided. Parking should be fully internalized and no public space should be utilized.

iii. A detailed traffic management and traffic decongestion plan shall be drawn up to ensure that the current level of service of the roads within a 02 kms radius of the project is maintained and improved upon after the implementation of the project. This plan should be based on cumulative impact of all development and increased habitation being carried out or proposed to be carried out by the project or other agencies in this 02 Kms radius of the site in different scenarios of space and time and the traffic management plan shall be duly validated and certified by the State Urban Development department and the P.W.D./ competent authority for road augmentation and shall also have their consent to the implementation of components of the plan which involve the participation of these departments.

VI. Green belt:

i. Green belt shall be developed in an area as provided in project details, with native tree species in accordance with Forest Department. The greenbelt shall inter alia cover the entire periphery of the project site.

ii. Top soil shall be separately stored and used in the development of green belt.

VII. Public hearing and Human health/safety issues:

i. Emergency preparedness plan based on the Hazard Identification and Risk Assessment (HIRA) and Disaster Management Plan shall be implemented.

ii. Provision shall be made for the housing of construction labour within the site with all necessary infrastructure and facilities such as fuel for cooking, mobile toilets, mobile STP, safe drinking water, medical health care, crèche etc. The housing may be in the form of temporary structures to be removed after the completion of the project.

iii. Occupational health surveillance of the workers shall be done on a regular basis.

VIII. Corporate Environment Responsibility:

i. The company shall have a well laid down environmental policy duly approve by the Board of Directors. The environmental policy should prescribe for standard operating procedures to have proper checks and balances and to bring into focus any infringements/deviation/violation of the environmental / forest / wildlife norms / conditions. The company shall have defined system of reporting infringements / deviation / violation of the environmental / forest / wildlife norms / conditions and / or share-holder's / stake holders. The copy of the board resolution in this regard shall be submitted to the MoEF&CC as a part of six-monthly report.

ii. A separate Environmental Cell both at the project and company head quarter level, with qualified personnel shall be set up under the control of senior Executive, who will directly report to the head of the organization.

iii. Action plan for implementing EMP and environmental conditions along with responsibility matrix of the company shall be prepared and shall be duly approved by competent authority. The year wise funds earmarked for environmental protection measures shall be kept in separate account and not to be diverted for any other purpose. Year wise progress of implementation of action plan shall be reported to the Ministry/Regional Office along with the Six Monthly Compliance Report.

iv. Self-environmental audit shall be conducted annually. Every three years third party environmental audit shall be carried out.

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IX. Miscellaneous:

i. The project proponent shall make public the environmental clearance granted for their project along with the environmental conditions and safeguards at their cost by prominently advertising it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days and in addition this shall also be displayed in the project proponent's website permanently (for projects involving incineration).

ii. The project proponent shall prominently advertise it at least in two local newspapers of the District or State, of which one shall be in the vernacular language within seven days indicating that the project has been accorded environment clearance and the details of MoEFCC/SEIAA website where it is displayed (For projects involving only Landfill without incineration).

iii. The copies of the environmental clearance shall be submitted by the project proponents to the Heads of local bodies, Panchayats and Municipal Bodies in addition to the relevant offices of the Government who in turn has to display the same for 30 days from the date of receipt.

iv. The project proponent shall upload the status of compliance of the stipulated environment clearance conditions, including results of monitored data on their website and update the same on half-yearly basis.

v. The project proponent shall submit six-monthly reports on the status of the compliance of the stipulated environmental conditions on the website of the ministry of Environment, Forest and Climate Change at environment clearance portal.

vi. The project proponent shall submit the environmental statement for each financial year in Form-V to the concerned State Pollution Control Board as prescribed under the Environment (Protection) Rules, 1986, as amended subsequently and put on the website of the company.

vii. The criteria pollutant levels namely; $PM_{2.5}$, PM_{10}, SO_2, NOx (ambient levels as well as stack emissions) or critical sectoral parameters, indicated for the project shall be monitored and displayed at a convenient location near the main gate of the company in the public domain (in case of incineration involved).

viii. The project proponent shall inform the Regional Office as well as the Ministry, the date of financial closure and final approval of the project by the concerned authorities, commencing the land development work and start of production operation by the project.

ix. The project authorities must strictly adhere to the stipulations made by the State Pollution Control Board and the State Government.

x. The project proponent shall abide by all the commitments and recommendations made in the EIA/EMP report, commitment made during Public Hearing and also that during their presentation to the Expert Appraisal Committee.

xi. No further expansion or modifications in the plant shall be carried out without prior approval of the Ministry of Environment, Forests and Climate Change (MoEF&CC).

xii. Concealing factual data or submission of false/fabricated data may result in revocation of this environmental clearance and attract action under the provisions of Environment (Protection) Act, 1986.

xiii. The Ministry may revoke or suspend the clearance, if implementation of any of the above conditions is not satisfactory.

xiv. The Ministry reserves the right to stipulate additional conditions if found necessary. The Company in a time bound manner shall implement these conditions.

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xv. The Regional Office of this Ministry shall monitor compliance of the stipulated conditions. The project authorities should extend full cooperation to the officer (s) of the Regional Office by furnishing the requisite data / information/monitoring reports.

xvi. The above conditions shall be enforced, inter-alia under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, the Air (Prevention & Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986, Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 and the Public Liability Insurance Act, 1991 along with their amendments and Rules and any other orders passed by the Hon'ble Supreme Court of India / High Courts and any other Court of Law relating to the subject matter.

xvii. Any appeal against this EC shall lie with the National Green Tribunal, if preferred, within a period of 30 days as prescribed under Section 16 of the National Green Tribunal Act, 2010.

7. This issues with the approval of the Competent Authority.

S. Bose

(Dr. Subrata Bose)
Scientist 'F'

Copy to:

1. The Secretary, Directorate of Environment, Government of Haryana, SCO 1-2-3, Sector 17-D (Second Floor), Chandigarh.
2. The Addl. Principal Chief Conservator of Forests (Central), Ministry of Environment, Forest and Climate Change, Regional Office (NZ), Bay No. 24-25, Sector 31-A, Dakshin Marg, Chandigarh -160030.
3. The Chairman, Central Pollution Control Board Parivesh Bhavan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi - 110 032.
4. The Member Secretary, Haryana Pollution Control Board, C-11, Sector-6, Panchkula–134109 Haryana
5. Monitoring Cell, MoEF&CC, Indira Paryavaran Bhavan, New Delhi.
6. Guard File/ Record File/ Notice Board.
7. MoEF&CC website.

S. Bose

(Dr. Subrata Bose)
Scientist 'F'

ANNEXURE-II

COPY OF OFFICIAL TOR LETTER FOR PROPOSED EXPANSION

F.No. J-13012/08/2020-IA.I(T)
Government of India
Ministry of Environment, Forest and Climate Change
(Impact Assessment Division)

3rd Floor, Vayu Block,
Indira Paryavaran Bhawan, Jor Bagh Road,
Aliganj, New Delhi-110003

Dated: 16.09.2020

To
The Additional Commissioner
M/s. Municipal Corporation Gurugram.
C-1, Near Honda Chowk, Info Technology Park,
Sector-34, Gurgaon.

Telephone No: 0124-2370911; **Email:** mswgurgaon2020@gmail.com

Sub: Proposed Expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW for Integrated Municipal Solid Waste Processing Facility (IMSWM) at Village Bandhwari, Tehsil & District Gurugram Haryana, by M/s Gurugram Municipal Corporation- reg. grant of ToR.

Sir,

The undersigned is directed to refer your online application No. **IA/HR/THE/162510/2020** dated 17.07.2020 for grant of ToR for expanding the Waste to Energy Power Project from 15 MW to 25 MW. The Environmental Clearance (EC) for 15 MW Waste to Energy Project was issued by the Ministry vide letter No.10-74/2016-IA.III dated 1.11.2019.

2. It has been informed that the project capacity of 15 MW Waste to Energy as per the EC dated could not be established due to delays in project planning and COVID-19. Further, the Municipal Corporation of Gurugram is proposing to augment capacity of Waste to Energy from 15 MW to 25 MW.

3. It has been informed that the project site is located at Bandhwari Village, Gurugram. The Bandhwari village is at 1.7 km in W direction from project site. The proposed waste to energy project is located adjacent to the municipal waste dump.

4. Further, Faridabad-Gurgaon Road (MDR-137) is at a distance of 300 m on north direction. The nearest road from the project site is NH-236 at a distance of 13.39 km in NW direction. Gurugram city is located at approx. 6.44 km in NW direction from the project site. Indira Gandhi International airport is the nearest airport at an aerial distance of 18.10 km in NNW direction from the project site. The Inter State boundary of Haryana and Delhi lies at a distance of 0.98 km in north direction from project site.

5. The Asola Wildlife Sanctuary boundary is located at at 300 m in NE direction from the project site which is beyond the Eco Sensitive Zone (ESZ) of Asola WLS which is 150 m as per MoEFCC notification vide S.O.1911 (E) dated 31.5.2019.

Page **1** of **6**

6. It has been informed that the project area is 30.5 acres. The land is already in the possession of Municipal Corporation of Gurugram. Thus, no land acquisition and Rehabilitation is involved. The co-ordinates of the project are as below:

Point	Latitude	Longitude
A	28°24'14.89"N	77°10'16.86"E
B	28°24'13.13"N	77°10'27.39"E
C	28°24'01.35"N	77°10'18.83"E
D	28°24'02.72"N	77°10'11.54"E

7. Total municipal solid waste to be processed in the project is 2100 TPD. After segregation, the Refuse Derived Fuel (RDF) of 1500 MT would be made available for incineration. The break-up of various types of waste is given as below:

Sl. No.	Type of waste	Quantity (MT)
1.	Composting	210
2.	Inert	130
3.	Recyclable	50
4.	Moisture loss	210
5.	RDF	1500
6.	Total	2100

8. The project consists of pre-treatment and waste collection facility, 2 mechanical grate incinerators (2x750 TPD), composting unit, Leachate collection and treatment system, Turbo generator.

9. The estimate of population and municipal waste generation is as below:

	Population for 2015	Waste generation (TPD)	Population Projected in 2035	Waste generation (TPD)
Gurugram	9.97 Lakhs	449 TPD	18 Lakhs	810 TPD
Faridabad	15.9 Lakhs	716 TPD	28.7 Lakhs	1290 TPD
Total	25.9 Lakhs	1165 TPD	46.75 Lakhs	2100

10. The break-up of land for the project site is given as below:

Facility	Area in Acres	% of total land
WtE Plant	6.56	21.57%
MSW processing area	3.35	11.03%
Roads/amenities	2.7	9%
Sanitary landfill	6.0	20%
Greenbelt	10.0	33%
Drain/sump	1.6	5.4%
Total	**30.5**	**100%**

11. It has been informed that Municipal Solid Waste (MSW) will be unloaded inside the pit where in 5-7 days of retention time is given to remove excess leachate/moisture. After leachate removal, primary segregation shall be undertaken to

recover the RDF fraction (>50 mm) for further storage. The compostable fraction of waste (<50 mm) will be shifted to windrow platform for composting. The inert removed through pre-processing system shall be directed to landfill. Windrow composting method shall be adopted for composting the compostable fraction of waste which is generated from pre-processing system. Leachate generated from MSW pit and windrow platform will be conveyed for treatment at Leachate Treatment Plant.

12. Water requirement during construction Phase is 8-10 KLD which will be sourced from Municipal Corporation of Gurgaon. Domestic water requirement during Operation phase is 0.5 m^3/h (i.e. 12 KLD) which will be sourced from Municipal Corporation Gurgaon by water tankers. The water requirement for plant purpose during operation phase is 45.9 m^3/h (i.e. 1101.6 KLD) which will be sourced from STP approved by GMDA for plant.

13. It has been informed that 2 boilers/grate incinerators will have two chimneys with height of 60 m. The following air pollution control systems shall be installed:

Parameter	Pollution Control
NOx	No air pollution control equipment is proposed. Boiler combustion temperature to be limited to 850°C so that NOx is limited.
Other Gaseous pollutants	Dry adsorption system using hydrate lime and activated carbon
Toxic substances Dioxins and Mercury	Activated Carbon Scrubber
Particulate Matter	Bag filter
Emission dispersion and monitoring	60 m height stack along with online stack monitoring systems

14. The leachate treatment plant with capacity of 500 KLD will be installed to treat the leachate. Inert material and other residues generated from plant such as ash will be sent to Sanitary land fill proposed within the project area. The flyash of 113 tons/day and bottom ash of 418 Tons/day are expected to generate from the plant area. Further, sludge of 1.2 tons/day is expected to generate from the activated carbon from the dry sorbent system. In addition, 15 Tons/day sludge is also expected to generate from the Leachate treatment plant. The ash will be utilised for construction purposes and unutilised ash will be disposed in sanitary landfill. The sludge from Leachate Treatment Plant will be used in Boilers as it has calorific value.

15. It has been informed that a case in NGT Central Bench vide OA No.514/2018 is under adjudication. It has been informed that the Orders/Directions from the Hon'ble

NGT are not relevant the proposed project. However, MCG has submitted revised action plan in compliance to order.

16. The estimated project cost is Rs. 617.01 Crores. The estimated employment during construction is 600 and during operation is 2100 persons.

17. The proposal was considered by the EAC (Thermal Power Projects) in its meetings held on 28.7.2020. In acceptance of the recommendations of the EAC (Thermal Power) in its meeting held on 28.7.2020 and in view of the information/clarifications furnished by you, **the Ministry hereby grants the following specific ToRs in addition to the Standard ToRs for the above mentioned project under Schedule 1(d): Thermal Power Projects of the EIA Notification dated September 14, 2006 and subsequent amendments, for preparation of EIA/EMP report:**

i. Proximate and ultimate analysis, Calorific value of municipal waste proposed to be brought from Gurugram and Faridabad shall be carried out for design purpose of boilers. Mass balance of waste in the process shall be submitted.

ii. Air pollution control measures including NOx control measures, Leachate treatment methods shall be proposed.

iii. The air pollution control measures and leachate treatment systems shall conform the emission and wastewater standards provided in Solid Waste Management Rules, 2016.

iv. Heavy metal content analysis in the fly ash and bottom ash shall be carried out at laboratory scale for similar plant to estimate the hazardous content of the ash generated from the waste to energy plant.

v. The bio-diversity study of Asola Bhatti Wildlife Sanctuary shall be carried out and likely impacts due to proposed project activities shall be predicted. Suitable mitigation measures along with bio-diversity conservation plan shall be prepared in consultation with Monitoring Committee of ESZ-Asola Bhatti Wildlife Sanctuary. An authenticated map showing Wildlife Sanctuary and its ESZ *vis a vis* project boundary shall be vetted by Chief Wildlife Warden for both national territory of Delhi and Haryana region.

vi. As the inter-state boundary of Haryana and Delhi lies at a distance of 0.98 km from project site, the affected people from Delhi residing within 10 km radius of the project shall also be invited to participate in the Public Hearing. Accordingly, the representative of Delhi Pollution Control Committee shall also be invited to the Public Hearing to ensure such participation.

vii. Proponent should utilise the treated water from Leachate treatment system instead discharging into the public sewerage and the balance water may be sourced from MCG which will reduce fresh water consumption.

18. The Standard ToRs for Thermal Power Projects to be complied with are uploaded on the website of the Ministry PARIVESH: https://parivesh.nic.in.

19. Besides the above, the following general points shall be followed:

a. All documents to be properly referenced with index, page numbers and continuous page numbering.
b. Where data is presented in the report especially in table, the period in which the data was collected and the source should invariably be indicated.
c. Where the documents provided are in a language other than English, an English translation should be provided.
d. The Questionnaire for environmental appraisal of thermal power projects as devised earlier by the Ministry shall also be filled and submitted.
e. The consultants involved in the preparation of EIA/EMP report after accreditation with Quality Council of India (QCI) / National Accreditation Board of Education and Training (NABET) would need to include a certificate in this regard in the EIA/ EMP reports prepared by them and data provided by other organization / Laboratories including their status of approvals etc. In this regard circular no. F.No. J-11013/77/2004-IA-II (I) dated 2nd December, 2009 is posted on the Ministry's website http://www.moef.nic.in may be referred.

20. In addition to the above, information on the following may also be incorporated in the EIA report.

1. Is the project intended to have CDM-intent?

(i) If not, then why?
(ii) If yes, then

a. Has PIN (Project Idea Note) or PCN (Project Concept Note) submitted to the NCA (National CDM Authority) in the MoEF?
b. If not, then by when is that expected?
c. Has PDD (Project Design Document) been prepared?
d. What is the Carbon intensity? from your electricity generation projected (i.e. CO_2 Tons/MWH or Kg/KWH)
e. Amount of CO_2 in Tons/year expected to be reduced from the baseline data available on the CEAs web-site (www.cea.nic.in)

2. Notwithstanding 1(i) above, data on (d) & (e) above shall be worked out and reported.

21. **The Environmental Clearance shall be applied only after fuel and water linkages are firmed up.**

22. After preparing the Draft EIA (as per the generic structure prescribed in Appendix-III of the EIA Notification, 2006) covering the above mentioned issues, the same shall be submitted to the concerned SPCB for conducting the public hearing as per procedure of EIA notification 2006. The issues emerged during public hearing shall be further incorporated in the Draft EIA/EMP report. The final EIA/EMP report along with public hearing report and the requisite documents (*including written objections, if any*) shall be submitted to the Ministry for appraisal by the Expert

Appraisal Committee for consideration of awarding environmental clearance under the provisions of Environmental Impact Assessment notification dated September 14, 2006.

23. The TORs prescribed shall be valid for a period of **four years** from the date of issue for submission of final EIA/ EMP reports, after public consultation.

This issues with the approval of the Competent Authority.

Yours faithfully,

(Dr. S. Kerketta)
Director, IA.I

Copy to:-

1. The Secretary, Ministry of Power, Shram Shakti Bhawan, Rafi Marg, New Delhi 110001.
2. The Chairman, Central Electricity Authority, Sewa Bhawan, R.K. Puram, New Delhi-110066.
3. The Chairman, Central Pollution Control Board, Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, Delhi-110032.
4. The Deputy Director General of Forests (C), Ministry of Environment, Forest and Climate Change, Regional Office (CZ), Regional Office (NZ), Bays No. 24-25, Sector 31 A, Dakshin Marg, Chandigarh – 160030.
5. The Directorate of Environment, Environment Department Haryana, Govt. of Haryana, 2nd Floor, SCO 1--3, 17D, Sector 54, Chandigarh, 160017.
6. The Chairman, Haryana State Pollution Control Board, C-11, Sector-6, Panchkula, Haryana 134109.
7. The District Magistrate Office South West, Government of Odisha, 1286, Old Delhi Gurgaon Rd, Kapas Hera Extension, Kapas Hera Estate, New Delhi, Delhi 110037.
8. Guard file/Monitoring file.
9. Website of MoEF&CC.

Director, IA.I

ANNEXURE-III

COPY OF EC COMPLIANCE CERTIFICATE FROM NORTHERN REGIONAL OFFICE OF MOEF&CC

भारत सरकार
GOVERNMENT OF INDIA
पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE
उत्तर क्षेत्रीय कार्यालय, चंडीगढ़ / Northern Regional Office, Chandigarh

No.: 6-18/2019 (ENV) / 622-624 Dated:24.09.2020

To

The Member Secretary,
Expert Appraisal Committee (Infra-2),
Ministry of Environment, Forest and Climate Change,
Indira Paryavaran Bhawan, Jor Bagh Road,
New Delhi – 110 003 (Email: lk.bokolia@nic.in)

Sub.: Integrated Solid Waste Processing Facility at Bandhwari Village, Gurgaon District, Haryana by M/s Gurgaon Municipal Corporation – Certification reg.

Ref.: 1. Environmental Clearance vide Ministry's letter no. 10-74/2016-IA.III dated 01.11.2019.
2. PP's letter dated 01.04.2020 for issuance of certification of compliance.

Sir,

Your kind attention is drawn to the above-mentioned subject & letters under reference. RO of the Ministry undertook the site visit on 08.09.2020 for certification of compliance. It was observed during the visit that no new work has been executed at the site as per EC dated 01.11.2019. Thus, a comprehensive report is not being prepared. However, the main observations are submitted below for further consideration of EAC to accord EC for the proposed expansion as deemed fit.

- To the tune of approximately 25 Lakhs MT unprocessed/legacy waste was lying at the proposed site.
- PP has channelized the leachate with layers of rubber sheets which is further being collected into ponds within the premises.
- RO systems were also installed to treat the leachate. However, as noticed during the site visit, the amount of leachate was increased manifold with repeated rainfall events in the rainy season. Thus, overflow of the diluted leachate from the site and further contamination of groundwater cannot be overruled.
- PP informed that total nine trommel machines are planned to process legacy mixed waste. However, only three machines (300 TPD/Machine) were operational during the site visit.
- Due to the continuous delivery of unsegregated waste by the local authorities at the site and the insufficient number of trommel machines installed to process the legacy mixed waste, the condition of the plant and the surrounding is subject to further deterioration.
- No litigation is pending against the PP, as submitted. One PIL, however, filed before the Hon'ble NGT vides M.A. No. 1310 of 2017 in OA No. 514 of 2015.

Sincerely,
24/09/2020
(Dr. Vimal Kumar Hatwal)
Joint Director/Scientist 'D'

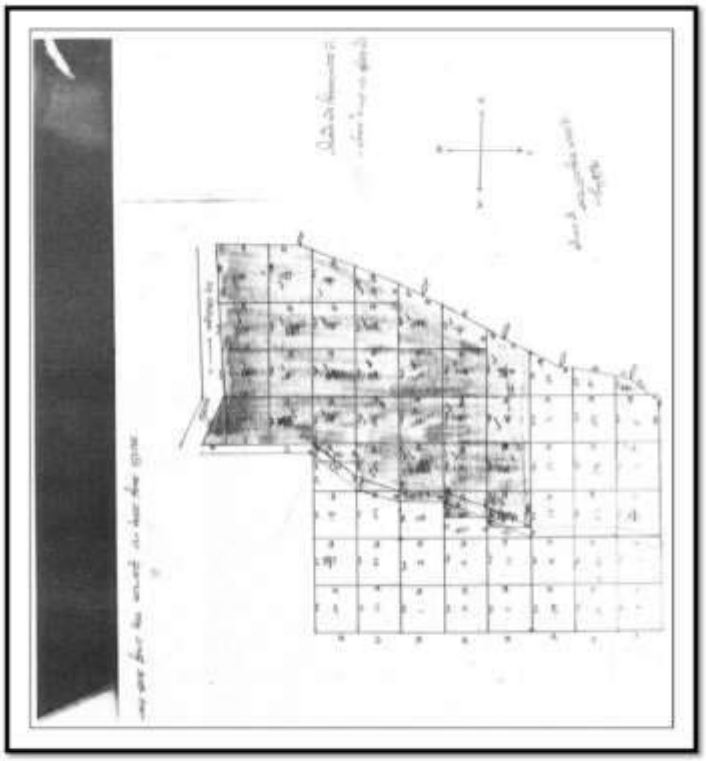
Copy to (for information):
1. Dr. Shruti Rai Bhardwaj, Scientist 'E' (Monitoring Cell), MoEFCC, Indira Paryavaran Bhawan, Jor Bagh Road, New Delhi,– 110 003, for information (Email: shruti.rai@nic.in).
2. The Additional Commissioner, MC, Gurugram, C-1, Info city, Sector-34, Gurugram – 122 004 (Email: mswgurgaon2020@gmail.com).

24/09/2020
(Dr. Vimal Kumar Hatwal)
Joint Director/Scientist 'D'

बेज नं. 24-25, सेक्टर-31ए, चंडीगढ़-160030 / Bays No. 24-25, Sector-31 A, Chandigarh-160030
दूरभाष/Tel No : 0172-2638994 Fax No : 0172-2638135 Email : cbdmoefenv@gmail.com; ronz.cbd-mef@nic.in

ANNEXURE-IV

LAND DOCUMENTS



Tehsildar
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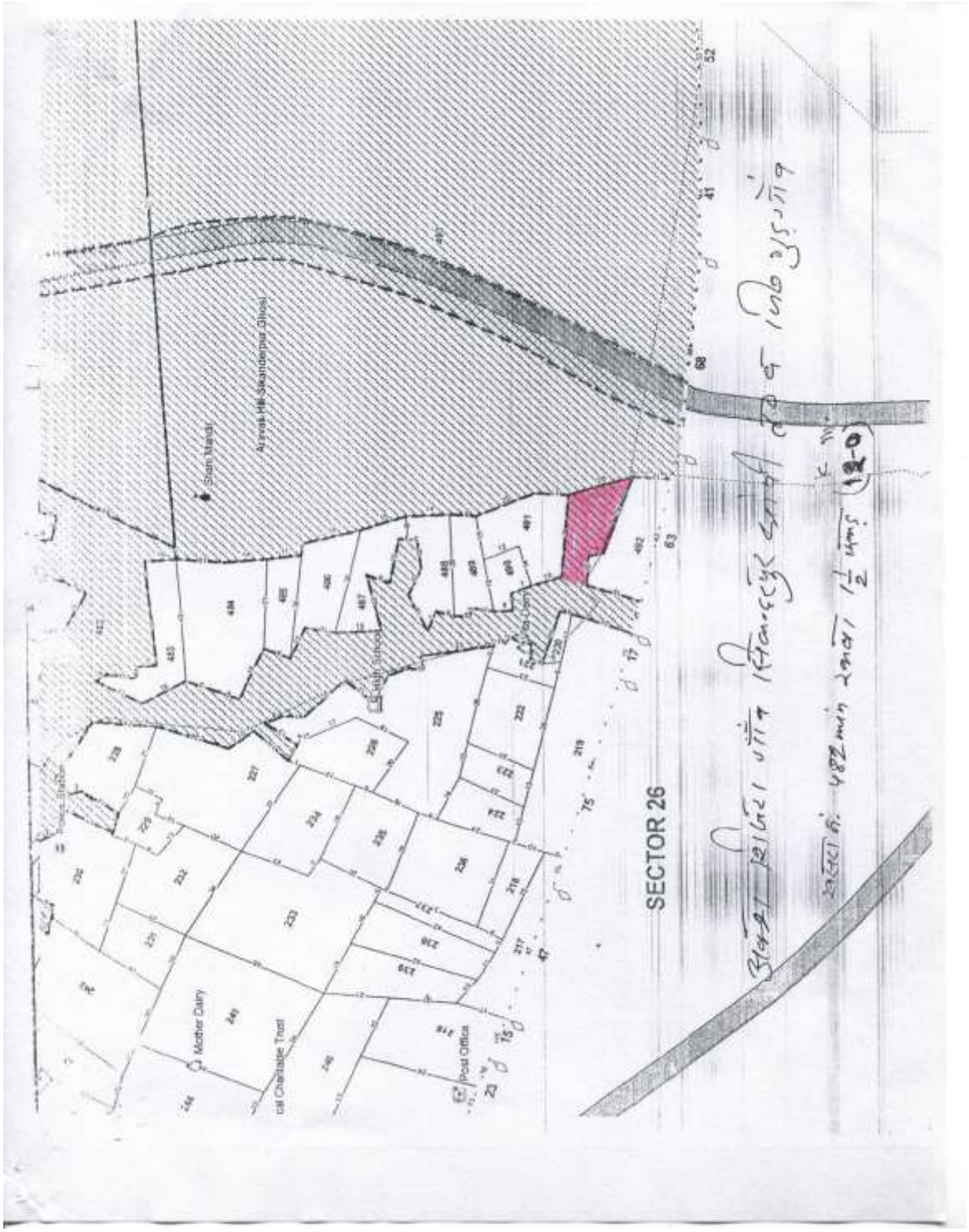
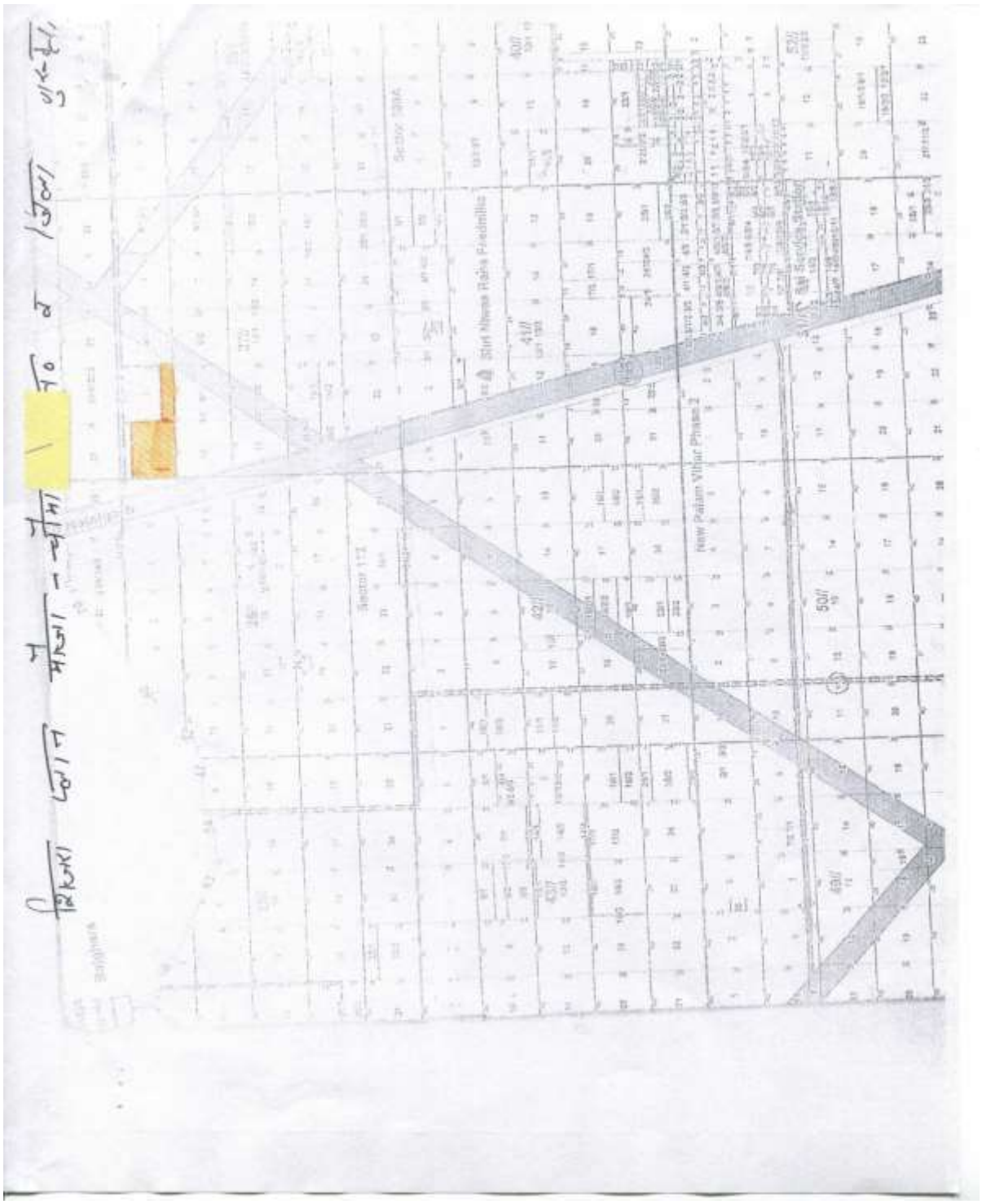

SECTOR 26
Aravali Hill-Sikandarpur Ghosi
Mother Dairy
Post Office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Schedule - B

Detailed list of land for Transfer Stations, Processing Facility and Landfill site.

Sr. No.	Zone	Village	Khasra No.	Rakba Kanal - Marla	Rakba Sqm	Amount of Rent payable @ Rs. One per Sq. Meter per Annum for Three Years.	Office of Sub-Registrar
1	I	Kadipur Transfer Station	14//16 25 +Kita 34	8-0 8-0 16-0	8094	24, 282/-	Sub-Tehsil Kadipur
2	IV	Begampur Khatola Transfer Station	26//19	8-0	4047	12,141/-	Sub-Tehsil Kadipur
3	II	Choma Transfer Station	27//1,2	8 - 2	4097	12292/-	Tehsil Gurugram
4	III	Sikanderpur Ghosi Transfer Station	482 Min	12-0	6070	18,210/-	Tehsil Gurugram
5	III	Bandhwari Landfill Site	46//5/2 6,15, 16, 17/1, 24/1, 24/2, 25, 47//8, 9, 10,11, 12,13, 18,19, 20,21, 22, 23 48//1, 2, 9,10, 11, 49//3/3,4, 5, 6, 7,8/1, 13/2, 14, 15	244-1	123453	3,70,359/-	Sub-Tehsil Wazirabad
			Total	**289-19**	**145761**	**437283/-**	

5-9-17

5/9/17

Schedule - A

Detailed list of land for Transfer Stations, Processing Facility and Landfill site.

Sr. No.	Zone	Village	Khasra No.	Rakba Kanal - Marla	Rakba Sqm	Amount of Rent payable @ Rs. One per Sq. Meter per Annum for Three Years.	Office of Sub-Registrar
1	II	Choma Transfer Station	27//1,2	8 - 2	4097	12292/-	Tehsil Gurugram
2	III	Sikanderpur Ghosi Transfer Station	482 Min	12-0	6070	18,210/-	Tehsil Gurugram

5/9/17

5.9.17

16. Any disputes and/or differences arising between the Parties, in relation to or under this Agreement will be resolved through arbitration in accordance with the relevant provision of the Concession Agreement pertaining to the dispute resolution clause. The venue of arbitration shall be Panchkula, Haryana

17. The Lessor hereby recognizes that this is a commercial act being undertaken by the Lessee and that it hereby unconditionally and irrevocably waives any right of immunity, sovereign or otherwise from legal proceedings that may be initiated to enforce any provisions of this Agreement.

IN WITNESS WHEREOF the Parties have placed their respective hands and seals hereto on the day, month and year first hereinabove written:

SIGNED, STAMPED AND DELIVERED ON 05.09.2017 BY

LESSOR THROUGH

Joint Commissioner-IV
Municipal Corporation
Gurgaon

Name : Gaurav Antil

Designation : Joint Commissioner, Municipal Corporation, Gurugram

LESSEE THROUGH

Name : Ankit Aggarwal

Designation : Director, M/s Ecogreen Energy Gurgaon Faridabad Private Limited.

In the presence of Witnesses

Sign :

Name : Y.S. GUPTA

Designation : Addl. MC, MCG

Sign :

Name : S. Agarwal

Designation : Project Co-ordinator
M/s Eco Green energy (P) Ltd

(c) that it shall not mortgage or create any third party rights in the earmarked premises except to the extent permitted herein and the Concession Agreement.

12. Lessor has requisite right and authority to lease the earmarked premises to Lessee for the Term of this Agreement for the purposes of the Project on the terms and conditions of this Agreement and further that Lessee shall have full, free and uninterrupted peaceful Vacant Possession, enjoyment/ occupation and use of the earmarked premises throughout the Term, without any obstruction interference or disturbance or claim whatsoever from the Lessor or from any person claiming through under or in trust for Lessor or from any third person whomsoever. Lessor shall keep Lessee fully indemnified and harmless against any claims or demands from any Person claiming right, title or interest to or in the earmarked premises or any part thereof or challenging the validity of the usage of the earmarked premises for the Project or challenging the validity of this Agreement, as also against any actions, proceedings, damages, losses and expenses caused to Lessee as a result or in consequence of any such claims or demands as aforesaid.

13. Otherwise as expressly provided in this Agreement no assignment of this Agreement or any rights or duties hereunder shall be made in whole or in part by any Party without the written consent of the other Party and in the event of any assignment the assignee shall assume the duties and liabilities of the assignor.

14. Otherwise as expressly provided in this Agreement no mortgage of leasehold interest shall be created of the land/site(s) under this Agreement in whole or part for obtaining term loan to finance the Project without the written consent of Lessor.

15. The Lessor hereby assures and represents to the Lessee that the vesting of the earmarked premises under this Agreement shall be irrevocable for as long as the Concession Agreement remains in force and the Lessor shall not terminate or seek to terminate this Agreement except upon the expiry or early termination of the Concession Agreement. The Parties hereby agree that on the expiry or termination of the Concession Agreement the Concessionaire shall hand back to the Lessor or its nominated agency free of cost, the vacant and peaceful possession of the earmarked premises in accordance with the provisions of the Concession Agreement.

5-9-17

(a) all the land comprising the Site is permitted and duly authorized and earmarked for purposes of establishment, construction, operation and maintenance of the Project site (s) as a part of the Project;

(b) the site is free from any encroachment or encumbrances whatsoever and is not subject to any acquisition or other legal proceedings by any authority, body or government nor is any claim of any third party subsisting in respect thereof or relating thereto;

(c) Lessor is the owner of the lands constituting the earmarked premises and it shall, in that capacity, defend or satisfy all actions or claims against the use of the earmarked premises for the Project;

(d) it shall not interfere with or impede in any manner or otherwise limit, restrict or impose any conditions or restrictions on the complete, free and full enjoyment and use of the earmarked premises and all rights in relation thereto, including the creation of security interest in favour of the Lenders in accordance with the provisions of the Concession Agreement after obtaining the prior consent of the Lessor;

(e) it shall not interfere in or impede in any manner or otherwise limit, restrict or impose conditions in relation: (i) to the construction, operation and maintenance of the Project site (s) (ii) the implementation of the Project by the Lessee and (iii) the possession, control and use, by the Lessee of the earmarked premises and the Project Site(s);

(f) it shall enter into appropriate further documentation or additional writings as the Lessee or the Lenders may reasonably require to give effect to the provisions of this Agreement and the financing agreements;

(g) there is no litigation, claim, demand or any proceedings (whether administrative, legal or quasi-judicial) pending before any authority in respect of the earmarked premises or its use for the purposes of managing, collecting, transporting, processing and disposing MSW; and

(h) Lessee shall have complete, lawful and uninterrupted, possession, control and use of the earmarked premises

11. The Lessee hereby covenants with the Lessor as follows:

(a) that it shall implement the ISWM Project as a part of MSW management for Faridabad-Gurugram Cluster in accordance with the Concession Agreement;

(b) that it shall observe and perform all terms, covenants, conditions and stipulations of this Agreement; and

5-9-17

to remove such encumbrances within thirty (30) days from the notice thereof, the Lessee may remove or cause to be removed such encumbrance and the costs and expenses or consequential liabilities incurred in respect thereof shall be reimbursed to the Lessee by the Lessor.

6. The earmarked premises are being vested with the Lessee, under this Agreement only for the purposes of the Project, including for the purposes of developing, establishing, designing, constructing, operating, and maintaining the Project site(s), which the Lessor is desirous of being constructed, operated and maintained on the earmarked premises for the purposes of enabling the Project activities in accordance with the Concession Agreement.

7. The Lessor hereby authorizes the Lessee, to construct, erect, own, operate and maintain any superstructure, facility or any movable or immovable structures constituting the Project site(s) on the earmarked premises and for that purpose also remove, renovate, use or demolish any structures that may be existing on the earmarked premises as of the date of this Agreement. The Lessor hereby agrees that the construction, operation and maintenance of the Project site (s) at the earmarked premises and the collection, storage, transportation, processing and disposal of MSW at the earmarked premises is being undertaken pursuant to the Concession Agreement granted by it and for the purposes of enabling the Lessee to discharge its functions of managing, processing and disposing MSW of the entire Cluster.

8. The Lessee shall have the right to, after taking prior permission of the Lessor, vest with the Lenders the power to take over the control, possession and all rights and interests in relation to the earmarked premises by appointing a person, the substitute entity, to replace the Lessee and undertake the construction, operation and maintenance of the Processing Facilities, in accordance with the provisions of the Concession Agreement, upon the occurrence of an event of default by the Lessee, as the case may be, under any of the financing agreements. The Lessor shall then novate this Agreement in favour of the substitute entity, which shall constitute an agreement between the substitute entity and the Lessor on the terms and conditions of this Agreement as existing at the time of such novation.

9. The Lessee agrees that it is not authorized to create any Encumbrance over the Project site(s) constructed on the earmarked premises.

10. The Lessor hereby covenants and assures the Lessee that:

5-9-17

3. In consideration of the Lessee undertaking to implement the Project in accordance with the provisions of the Concession Agreement and undertaking to pay the lease payment stipulated in Clause 4 below; the Lessor hereby demises to the Lessee, all the land (together with any physical structures existing thereon) which is described, delineated and shown in the **Schedule A** hereto (the "**earmarked premises** "), to hold the said earmarked premises, without interruption or interference together with the full and free right and liberty of way and passage and other rights in relation thereto, for as long as the Concession Agreement does not lapse due to expiry of its term or is not terminated earlier in accordance with the provisions thereof. The term of this Agreement shall be co-terminus with the Concession Agreement. The Lessor hereby agrees and authorizes the construction, operation and maintenance of the Project site(s) on the earmarked premises in accordance with the terms of the Concession Agreement.

4. In consideration of the transfer of the earmarked premises under this Agreement, the Lessor shall, effective from the date of handover of the possession of the earmarked premises to the Lessee, **receive a rent of Rupee one per square meter per annum. The first instalment of rent which is 437283/- (Rupees Four Lacs Thirty Seven Thousand Two Hundred & Eighty Three only) for the total area of 145761 Sq Mtr in respect of a period of three (3) years shall be payable at the time of signing of this Agreement by way of a demand draft in favour of "Commissioner, Municipal Corporation, Gurugram" payable at Gurugram**. Thereafter the rent in respect of each subsequent block of three years shall be payable by the Lessee in advance on the same date after every three years. The Lessor undertakes and assures the Lessee that the lease payment for the earmarked premises shall remain fixed for the entire period that this Agreement remains valid and binding.

5. The earmarked premises are being vested with the Lessee, under this Agreement, free from any Encumbrances (other than the existing physical structures thereon which has been inspected by the Lessee and agreed to be taken over in accordance with the terms of This Agreement and the Concession Agreement), whether legal or physical in nature. At any time during the term of this Agreement if the Lessee discovers any Encumbrances upon or under the earmarked premises which materially adversely affect its rights in relation to the earmarked premises /the Project, it shall notify the Lessor, which shall, within thirty (30) days from the receipt of the notice, either remove or cause to be removed such encumbrances at its own cost. In the event that the Lessor fails

5-9-17

The Municipal Corporations of Gurugram and Faridabad are desirous of improving its municipal solid waste (MSW) management and disposal capabilities in order to enable the due discharge of their functions under the Solid Waste Management Rules, 2016 and its amendments framed by the Government of India under the Environment (Protection) Act, 1986 (Act 29 of 1986) and including any statutory amendments / modifications thereto or re-enactments thereof, for the time being in force from time to time] and for that purpose has proposed to develop an Integrated MSW Management Project for the Faridabad-Gurugram Cluster. To carry out MSW Management activities in the Faridabad-Gurugram Cluster and to develop Transfer Station, Processing and Disposal Facilities as a part of Integrated MSW Management project for the Faridabad-Gurugram Cluster by the Lessee, Municipal Corporation of Gurugram has entered into a Concession Agreement dated **14.08.2017**, under which it has authorized the Concessionaire to implement the Project.

B. The Municipal Corporation of Gurugram in order to enable the due implementation of the Project for the Faridabad-Gurugram Cluster and to discharge its obligations under the Concession Agreement signed with the Municipal Corporations of Gurugram and Faridabad , is hereby providing the Lessee (the Concessionaire under the Concession Agreement), by way of the present Lease Agreement ("**this Agreement**"), the earmarked premises **(more particularly delineated in Schedule A hereto and shown in the Site map attached thereto**) to setup Transfer Station (Collection & Transportation), Processing and Disposal Facilities for the purposes of implementing the ISWM Project for Faridabad-Gurugram Cluster and constructing, operating and maintaining the Project site(s) as a part of the Project on the earmarked premises, on the terms and conditions and subject to the covenants and stipulations hereinafter contained.

NOW THIS INDENTURE OF LEASE WITNESSETH AS FOLLOWS:

1. The Lessor hereby leases the earmarked premises to the Lessee for a period commencing from the date of execution of this Lease Agreement and co-terminus with Concession Period ("**Term**"). This Agreement is to be read, for any interpretation, together with the provisions of the Concession Agreement.

2. The terms that are used but not defined herein shall have the same meaning as given to them in the Concession Agreement.

5-9-17

Bond

Indian-Non Judicial Stamp
Haryana Government

Date :05/09/2017

Certificate No. G0E2017I262

GRN No. 30192783

Stamp Duty Paid : ₹ 101

Penalty :₹ 0

Deponent

Name: Ecogreen Energy Gurgaon faridabad pvt ltd
H.No/Floor : Na Sector/Ward : Na Landmark : Na
City/Village : Gurugram District : Gurugram State : Haryana
Phone : 0

Purpose : GENERAL to be submitted at Other

STAMP VENDOR GURGAON

LAND LEASE AGREEMENT

Lease Deed for Transfer Stations, Processing Facility & Landfill Site

This **LEASE AGREEMENT** made on the **5th** day of **September** in the year **Two Thousand and Seventeen**

BETWEEN

Municipal Corporation Gurugram, a statutory body constituted under the Haryana Municipal Corporation Act, 1994 and having its office at **C-1, Tower-B, Infocity-I, Sector-34, Gurugram-122004** (hereinafter referred to as "**the Lessor**" which expression shall unless repugnant to the context thereof, include its successors & assigns).

AND

M/s Ecogreen Energy Gurgaon Faridabad Private Limited, a special purpose vehicle incorporated under the provisions of Companies Act, 2013 or Concessionaire, and having its registered office at **160, Tatvam Villas, Sector-48, Sohna Road, Gurugram** (hereinafter referred to as ""**Lessee**" which expression shall unless it be repugnant to the subject or context be deemed to include its successors and permitted assigns).

WHEREAS

5-9-17

ANNEXURE-V

NGT ACTION PLAN

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

IN

Original Application No. 514 of 2018

IN THE MATTER OF:

Vivek Kamboj & Anr. ..... Applicants

Versus

State of Haryana & Others ..... Respondents

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1	Revised Action Plan for Bandhwari Scientific Management of MSW.		2-8
2	Copy of land agreement for fresh MSW processing site for Municipal Corporation, Gurugram.	R/1	9-11
3	Copy of action plan along with land details for fresh MSW processing site for Municipal Corporation, Faridabad	R/2	12
4	Copy of Layout of new site, Gurugram	R/3	13
5	Copy of Layout of new site, Faridabad	R/4	14

FILED BY:

Commissioner,
Municipal Corporation,
Gurugram

BEFORE THE HON'BLE NATIONAL GREEN TRIBUNAL

PRINCIPAL BENCH, NEW DELHI

IN

Original Application No. 514 of 2018

IN THE MATTER OF:

Vivek Kamboj &Anr. ..... Applicants

Versus

State of Haryana &Anr. ..... Respondents

REVISED ACTION PLAN ON BEHALF OF MUNICIPAL CORPORATION OF GURUGRAM.

Respectfully Showeth:-

1. That Municipal Corporation Gurugram in compliance of order dated 19.11.2019 had filed an Action Plan and progress report on 21.01.2020 and in continuation of which a supplementary report dated 18.02.2020 had also been filed. The Hon'ble Tribunal on 19.02.2020 considered the Action Plan and directed to submit Revised Action Plan for Bioremediation and Biomining of legacy municipal solid waste within 06 months.

2. That based on the direction of this Hon'ble Tribunal, Municipal Corporation Gurugram has reworked on the Action Plan considering immediate steps

-2-

for handling fresh and legacy municipal solid waste (MSW) and the same are summarized in the following paras of the instant report.

3. **Treatment and disposal of fresh MSW by Municipal Corporations of Gurugram and Faridabad, (hereinafter called as "MCG" & "MCF"):-**

i. That in order to reduce pressure at the Bandhwari Landfill Site due to combined disposal of approximate 1900 metric tons per day of fresh MSW from both the Corporations, it has been decided by both the Corporations to scientifically process fresh waste at new sites, so that legacy MSW at Bandhwari site can be treated within the timeline mention by this Hon'ble Tribunal. This has been necessitated by lack of available space at Bandhwari site to handle both Fresh & Legacy MSW simultaneously.

ii. That to process the approximate 1900 Metric tons of fresh MSW daily within the jurisdiction of both Corporations, in scientific manner as prescribed by SWM Rules 2016 and CPCB, it has been decided that from 15th March 2020 onwards fresh MSW of both Corporations will be transported and bio-remediated for 4-5 weeks at the new identified site.

iii. That the possession of the new identified sites have been taken by both the Corporations in their respective jurisdictions for scientific treatment and disposal of fresh MSW, copy of both are annexed herewith. **(Annexure R/1 and R/2)**

-3-

iv. That the layout plans of the both fresh MSW processing facilities have been prepared by both Corporations for the execution of work and the same is annexed herewith **(Annexure – R/3 & R/4)**

v. That as per guidelines of CPCB, sites are being lined up with HDPE membrane and the proposed combined processing capacity of both sites is (1200 MT from MCG + 900 MT from MCF) = 2100 TPD. Work for treatment of fresh MSW is proposed to be done by both Corporations on their own through assistance of solid waste management experts. The schedule of deployment of trommels at the new sites for bio-mining of bio-remediated fresh MSW is as under:

For **Gurugram :-**

Sr. No.	Schedule	Schedule of Deployment
1	Trommel 1 (Capacity of 300 TPD in single shift).	On or before 11th March 2020
2	Trommel 2 (Capacity of 300 TPD in single shift).	On or before 25th March 2020
3	Trommel 3 (Capacity of 300 TPD in single shift).	On or before 5th April 2020
4	Trommel 4 (Capacity of 300 TPD in single shift).	On or before 15th April 2020

For Faridabad

Sr. No.	Schedule	Schedule of Deployment
1	Trommel 1 (Capacity of 300 TPD in single shift).	On or before 11th March 2020
2	Trommel 2 (Capacity of 300 TPD in single shift).	On or before 25th March 2020
3	Trommel 3 (Capacity of 300 TPD in single shift).	On or before 5th April 2020

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vi. Considering the future annual increase of 5% in waste generated within both Corporations, the above proposed processing capacity at both sites will be sufficient for next 3 years.

vii. That bio remediation of fresh MSW is expected to start from 15th March 2020 onwards, as per the CPCB guidelines for bio-stabilization through windrow methodology and spray of bio culture. After the fresh MSW is stabilised for 4-5 weeks in windrows, bio-mining will start from 15th April 2020 onwards, however, installation of trommels will start from 11th March onwards. Till the time stabilized waste is ready for bio-mining, the waste processing capacity will be of 2100 TPD. Further, by adopting the CPCB guidelines for bio-stabilization of fresh waste it will be ensured that minimum leachate is generated and necessary steps for safe collection of same will be done at the processing site. The collected leachate will be transported to CETP, Manesar (Gurugram) and CETP, Sector-25 (Faridabad) respectively for scientific treatment and final disposal.

viii. Both the Corporations have already done arrangements for disposal of byproduct, which will be generated after bio-mining process, such as :

- Refuse-Derived Fuel (RDF) will be sent to nearby cement kilns and Waste to Energy plants
- C&D waste recovered from bio-mining will be sent to C&D waste processing plant of MCG, which is situated next to the site of proposed MSW processing plant.
- 100% reuse of compost in parks, gardens, dividers etc. under the jurisdiction of MCG & MCF

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4. **Treatment of Legacy MSW at Bandhwari:-**

i. That from 15th March 2020 onwards fresh MSW will not be transported to Bandhwari by both Municipal Corporation Gurugram and Municipal Corporation Faridabad.

ii. That considering the legacy MSW at the site, which is approximately 27.5 Lacs MT, the MCG will immediately install necessary processing capacity / infrastructure to the tune of 1800 TPD within next 45 days for treatment of legacy MSW, which will be further enhanced as per below given schedule.

iii. That further segregated fraction of Refuse-Derived Fuel (RDF) and compost of around 5000 MT, which was stored at Bandhwari site has been removed with immediate effect to create additional space for installation of additional processing capacity of 1200 TPD. Compost has been utilized for horticulture by MCG and RDF has been channelized to nearby cement klins and Waste-to-Energy plants.

iv. That additionally 2 DTROs (Disc-type Reverse Osmosis units) have been made operational at site with leachate processing capacity of 400 KLD. With the current processing capacity 4-5 acres of space occupied by leachate storage ponds will also be cleared in next 4 months and additional space will be created for further installation of processing capacity as per the below mentioned schedule.

v. That further, to treat total 27.5 lakhs MT within timeline as directed by this Hon'ble Tribunal, the revised schedule/action plan has been prepared for installation of higher processing capacity at Bandhwari

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site by MCG for treating legacy waste in shortest possible time. Currently 02 trommels of 600 TPD are operational at site and process of installation of additional 02 trommels with 600 TPD capacity will be completed by 3rd week of March 2020. The revised action plan for installation of additional capacity for treating legacy MSW is as under :-

Sr. No.	Trommel Machine Installation Time	No. of working Trommels	Capacity of each trommel (TPD)	Waste to be Bio remediated (In Ton)	Waste to be bio-mined by working in two shift (In Ton)
1	March 2020	4	300 TPD	100000	72000
2	April 2020	6	300 TPD	150000	108000
3	May 2020	8	300 TPD	200000	144000
4	June 2020	10	300 TPD	250000	180000
5	July 2020	12	300 TPD	300000	216000
6	August 2020	14	300 TPD	350000	252000
7	September 2020	16	300 TPD	400000	288000
8	October 2020	18	300 TPD	450000	324000
9	November 2020	20	300 TPD	500000	360000
Total				**27,00,000**	**19,44,000**

vi. The above revised action plan has been made considering that the weight of dumped legacy MSW will be reduced by 40% after proper stabilisation and bio-remediation and the reduced weight will be processed through bio-mining.

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vii. That as per the direction of this Hon'ble Tribunal, MCG will undertake processing of legacy MSW on its own through assistance of solid waste management experts instead of further relying on the concessionaire.

viii. That in pursuance to the detailed environmental damage cost assessment report submitted by CPCB and NEERI before this Hon'ble Tribunal, the contents of which are being examined in detail by state government for suitable remedial actions, MCG undertakes to discharge its due responsibility to prevent future potential environmental damage by ensuring compliance of safeguards prescribed under SWM Rules 2016 and CPCB guidelines.

In view of above, it is submitted that Municipal Corporation, Gurugram is taking sincere efforts for waste management and ensuring implementation of environmental safeguards. It is further undertaken to comply with the directions passed by this Hon'ble Tribunal in true letter and spirit.

Place : Gurugram
Date : 26.02.2020

Vinay Pratap Singh
Commissioner,
Municipal Corporation, Gurugram

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Annexure R/1 (Colly)

Bond

Indian-Non Judicial Stamp
Haryana Government

Date : 25/02/2020

Certificate No. G0Y2020B2929

GRN No. 63028462

Stamp Duty Paid : ₹ 101

Penalty : ₹ 0

Deponent

Name : Gmda
H.No/Floor : 0 Sector/Ward : Landmark : Na
City/Village : Gurugram District : Gurugram State : Haryana
Phone : 80******67

Purpose : AGREEMENT **to be submitted at Gurugram**

The authenticity of this document can be verified by scanning this QrCode Through smart phone or on the website https://egrashry.nic.in

LEASE AGREEMENT

This Lease deed made at Gurgaon, Haryana on this 26th day of February 2020, between Sh. Amar Deep Singh, Addl. CEO, GMDA hereinafter called the "LESSOR') which expression shall include their administrators, executors, legal representatives and assigns of the one part,

AND

Sh. Mahabir Parsad, Addl Commissioner MCG (hereinafter called the "LESSEE") which expression shall unless repugnant to the context or meaning thereof be deemed to include their administrators, executors, legal representatives and assigns of the other part.

Whereas the LESSOR is a bonafide owner of the land measuring 5 acres falling in sector-101, Gurugram is part of WTP Basai (hereinafter referred to as the "Demised Premises") And whereas the LESSEE has approached to the LESSOR that they require this land for **six months** for segregation of waste generated in the city as transfer station for further disposal to solid waste disposal plant as per directions of NGT.

And whereas on the approach of the LESSEE the LESSOR has agreed to lease the above said land measuring 500'-0"*436'-0" (app 5 acres) from Khasra No.

(10)

58/1, 58/2, 59 & 60. The LEASE AGREEMENT IS WITNESSED BETWEEN LESSOR AND LESSEE AND AGREED AS FOLLOWS:

1. That the Lease has been signed for a period of Six months commencing w.e.f 26th February 2020

2. That the LESSEE shall pay to the LESSOR the rent @ Rs. 50,000/- per acre per month i.e. Rs.1500000/- (Rs fifteen lakh) in advance by cheque or online transfer or mutually agreed mode of payment.

3. That the LESSEE shall pay an interest free security deposit Rs. 2,00,00,000/- (Rupees two crore only), at the time of signing this Lease Deed, which shall be returned to the LESSEE, at the time of vacating the premises after deducting dues, breakages if any

4. If the LESSEE fails to vacate the land after expire of the lease period i.e. Six months, a penalty of Rs. 10,00,000/- per acre per month shall be charged for next Three Months, which shall be deducted from the security deposit. If the land is not vacated by the end of 9 months from the date of beginning of the lease period, LESSOR shall dismantle all infrastructures on the cost of LESSEE without any Notice.

5. That the LESSEE shall make arrangements for creating an impervious layer at the base of dumping yard with the provision of collection and disposal of leachate generated in the waste as per CPCB norms, so that there is no ground water pollution before execution of work of segregation and their cost and will restore the status to its original condition after expiry of the lease period.

6. That the LESSEE shall fence the lease area and use the land earmarked only for segregation purposes and shall not sub-let or transfer any part of premises to any third party. It shall be exclusive responsibility of the LESSEE to restore possession of the premises to the LESSOR on expiry of the Lease.

7. That day–to–day repair shall be borne by the LESSEE at his own expenses.

8. That in case of termination of this agreement, which can be effected by serving notice as in clause no 9, the LESSEE undertakes to vacate the said premises at the expiry of the notice, or six months from the date of beginning of lease, whichever is earlier, and also undertakes to handover vacant and peaceful possession of the land in the same condition as they are now and will also be responsible for any damage done to land.

11

9. That the lease can be terminated by the LESSOR/ LESSEE after giving **one-month notice** to the either side,

10. That the LESSEE shall permit the LESSOR or his authorized agents to enter upon the demised premises for inspection.

11. That the LESSEE shall comply with all the rules and regulations of the local authorities applicable to the land.

12. That the LESSEE shall clear all outstanding bills for electricity charges till the last date of occupancy.

13. That both the parties shall observe and adhere to the terms & conditions contained thereinafter.

14. If any dispute/ differences arises out of or concerning the subject matter of this Agreement or otherwise provided, the jurisdiction shall be at Gurgaon for all legal proceedings.

IN WITNESS WHERE OF THE Parties HERETO HAVE HEREIN SET THEIR RESPECTIVE HANDS ON THIS DEED ON THIS 26th FEBRUARY, 2020 IN PRESENCE OF WITNESSES.

WITNESSES:

26/2/20

1. Sh. Lalit Arora
Chief Engineer, Infra-II,
GMDA Gurugram.

2. Sh. K.C. Sharma
GM (T)-cum-Project Coordinator,
GMDA, Gurugram.

26/2/2020

LESSOR
Sh. Amar Deep Singh,
Addl. CEO, GMDA Gurugram
Authorized Signatory.

26/2/2020

LESSEE
Sh. Mahabir Parsad
Addl. Commissioner, MCG Gurugram.
Authorized Signatory

Municipal Corporation, Faridabad
B.K. Chowk N.I.T Faridabad -121001, Haryana India
Tel. : 0129-2411648, 2411664, 2415549
Fax : 0129-2415465

Annexure R/2

From

Commissioner,
Municipal Corporation,
Faridabad.

To

The Commissioner,
Municipal Corporation,
Gurugram.

Memo No. MCF/PA/2020/93 Date: 26/02/2020

Subject: - Action taken report to prevent the fresh waste in Bandhwari as per directions of Hon'ble NGT.

1. The land having 10 Acre area has been identified and under possession of Municipal Corporation, Faridabad for treatment of fresh Municipal Solid Waste (MSW) in the revenue estate of Village Sihi.
2. The boundary wall of the lane has been started.
3. As per guidelines of CPCB site is being lined up with HDPE liner and processing capacity of the site is 900 TPD.
4. The schedule of deployment of trammels at new site for bio-mining of bio-remediated fresh MSW is as under:-

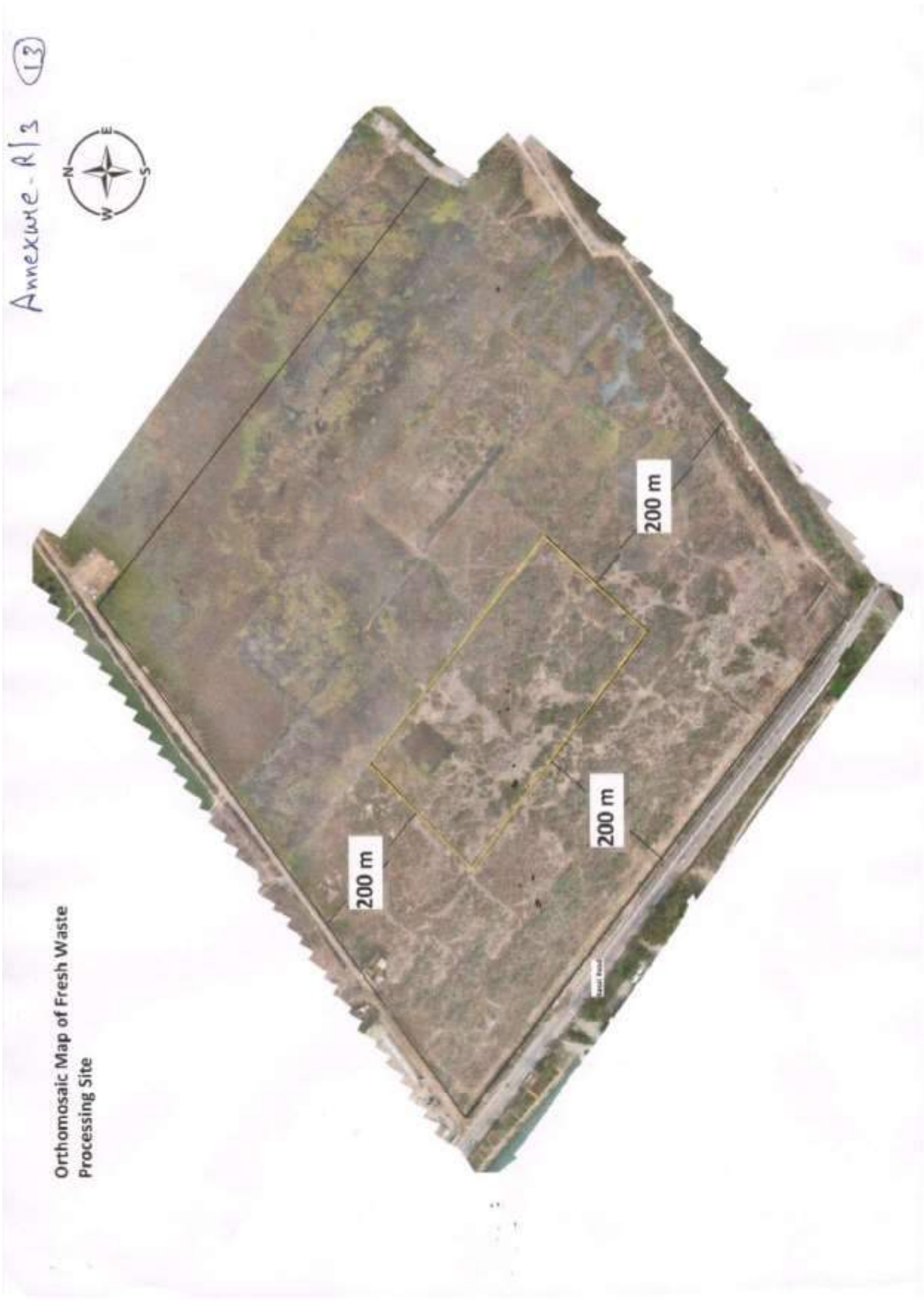
Sr. No.	Schedule	Schedule of deployment
1	Trammel 1 (Capacity of 300 TPD ins ingle shift)	On or before 11th March, 2020
2	Trammel 2 (Capacity of 300 TPD ins ingle shift)	On or before 25th March, 2020
3	Trammel 3 (Capacity of 300 TPD ins ingle shift)	On or before 5th April, 2020

5. The bio-remediation of fresh waste is expected to start from 15th March, 2020 onwards as per CPCB guideline for bio-establishing through windrow methodology and spray of bio-culture. After the fresh MSW is established for 4-5 weeks in windrows bio-mining will start from 15 April, 2020 onwards. However, the installation of trammels will be start from 11th March, 2020. The collected leachate will be transported to CETP Sector-25 for scientifically treatment.
6. The waste will be processed scientifically as per MSW Rules, 2016 and guidelines of CPCB onwards 15/03/2020, subject to condition approval of HSPCB.

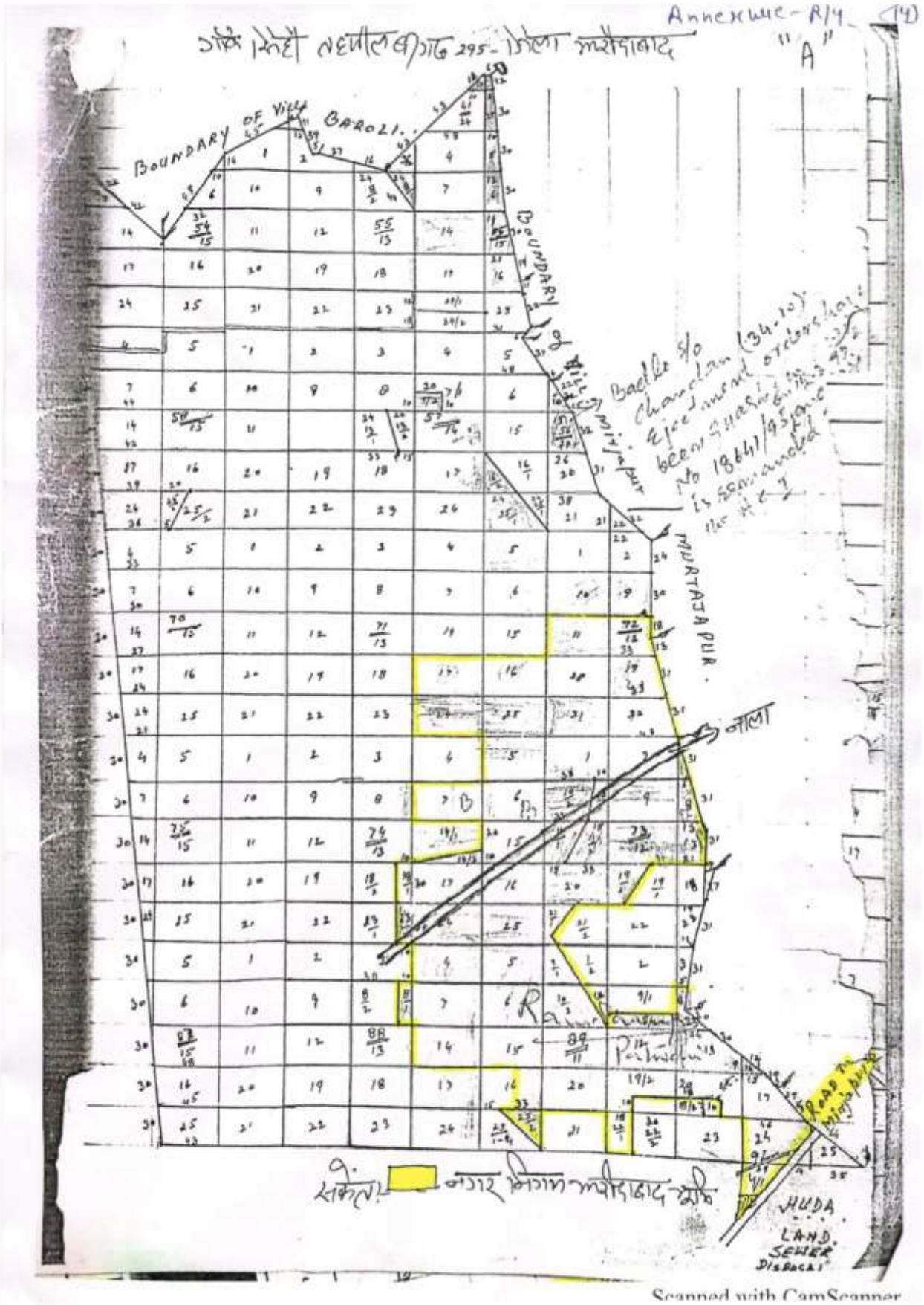
The above information is being sent to your office for kind information and taking necessary action in this regard pleas.

Commissioner
Municipal Corporation,
Faridabad

Annexure-R/3 (13)



Orthomosaic Map of Fresh Waste Processing Site


Annexure-R/4 (4)
"A"
BOUNDARY OF VILLAGE BAROLI
BOUNDARY OF
MIR PUR
MURTAJA PUR
HUDA
LAND
SEWER
Scanned with CamScanner

Annexure R/1 Colly 9

Item No. 13 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI

Original Application No. 514/2018
(Earlier O.A. No. 415/2015)
(I.A No. 689/2019)

(With Report dated 13.11.2019)

Vivek Kamboj & Anr. Applicant(s)

Versus

Union of India & Ors. Respondent(s)

Date of hearing: 19.11.2019

CORAM: **HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON**
HON'BLE MR. JUSTICE S.P WANGDI, JUDICIAL MEMBER
HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER
HON'BLE MR. SAIBAL DASGUPTA, EXPERT MEMBER

For Applicant(s): Mr. Rahul Choudhary, Advocate

For Respondent(s): Mr. Rajkumar, Advocate for CPCB
Mr. Sameer Singh, Advocate
Mr. Anil Grover, AAG with Mr. Rahul Khurna, Advocate
Mr. Amit Khatri, Commissioner, MCG
Ms. Sonal Goyal, Commissioner, MCF

ORDER

1. This order may be read in continuation of order dated 10.07.2019. The issue for consideration is the remedial action for dealing with the legacy waste at Gurugram which includes waste of Faridabad. The matter has been pending before this Tribunal for the last four years. This Tribunal has repeatedly recorded findings of incapacity and incompetence of the concerned authorities in dealing with the matter for scientific disposal of waste so as to ensure compliance of the statutory procedure under the Solid Waste Management Rules, 2016

and also inability of the contractor hired in producing the results. The dumped waste has resulted in leachate being discharged into the water bodies, contaminating the ground water and polluting the surface water, apart from causing air pollution and hazard to public health.

2. We may briefly note the factual background and proceedings which have taken place so far. The application was originally filed on 16.09.2015 with the grievance of unscientific disposal of solid waste causing leachate, contamination of ground water and pollution of surface water. The Tribunal directed necessary steps to be taken and report to be furnished by the CPCB. The matter was then considered on 18.01.2018 in light of the report of the CPCB. It was noted that the Municipal Corporation of Gurugram (MCG), Municipal Corporation of Faridabad (MCF) and the Urban Local Bodies, Haryana had entered into an agreement with M/S Ecogreen Energy Gurugram Faridabad Pvt. Ltd. (hereinafter referred to as Concessionaire) on 14.08.2017 to establish an Integrated Solid Waste Management Plant to cater for collection, transportation, processing and disposal of waste generated from Gurugram-Faridabad Cluster, comprising Municipal limits of Gurugram and Faridabad for a period of 20 years. In September 2017, the MCG handed over Bandhwari landfill site to the Concessionaire and the latter was responsible for establishment of Waste-to-Energy Plant at the landfill site and for management and treatment of the legacy waste at landfill site. The construction for the Waste-to-Energy plant is said to have begun in April 2018 in accordance with the SWM Rules and NGT orders to eliminate unscientific open dumping and burning of wastes at the landfill site. The Concessionaire pleaded

that the Bandhwari dumpsite was already 20-25 meters above the ground level, and the land allotted to them was already 60% covered in legacy wastes.

3. After considering the report of the CPCB, vide order dated 10.07.2018 the application was disposed of with the following directions:

(i) Concessionaire will start working on management of legacy waste as per the suggestions made by CPCB;
(ii) Concessionaire will implement segregation of municipal solid wastes as per the rules;
(iii) Concessionaire will address the issue reports in Hindustan Times, dated 29.06.2018; and
(iv) State of Haryana will also be responsible for the above as the Concessionaire is merely an agency.

4. The compliance report, furnished in pursuance of above, was considered on 21.08.2018 and since the same was found to be unsatisfactory, a further inspection was directed to be conducted. Accordingly a report dated 04.10.2018 was submitted showing unsatisfactory state of affairs which was noticed in the order dated 01.03.2019 and 05.03.109 when the Tribunal *inter alia* directed formation of a joint committee of CPCB, IIT Delhi and NEERI to determine the monetary cost of damage caused to the environment. Again on 14.03.2019, directions were issued as follows:

> *"An action plan has been filed which proposes setting up of segregation unit for the incoming waste and inviting experts for scientific treatment of legacy waste and leachate. Since most of the remedial actions mentioned in action plan are proposed to be undertaken in future, in the light of serious past failures, it will be appropriate that the Municipal Corporation, Gurgaon is required to furnish performance guarantee in the sum of Rs. 25 lakhs to the satisfaction of CPCB within one month undertaking to comply with the steps mentioned in the action plan, within the timelines proposed. We order accordingly. It is made clear that the amount of Rs. 25*

lakhs will stand forfeited in the case of default and may be recovered from the erring officers of the Corporation."

5. The matter was thereafter reviewed on 10.07.2019 as follows:

"

9. *Though the Expert Committee constituted vide order dated 05.03.2019 required assessment of damage to the environment in monetary terms and the cost of restoration, the report did not deal with this aspect. We are informed that the said assessment is yet to be done which work stand assigned to the National Environmental Engineering Research Institute (NEERI) by the Central Pollution Control Board (CPCB). Let the same be expedited and report furnished to this Tribunal before the next date.*

10. *The joint interim report dated 25.05.2019, filed in pursuance of order dated 23.04.2019, submitted by Commissioner, MCF and Additional Municipal Commissioner, MCG is to the effect that the Director General, Urban Local Bodies Department, Haryana visited the landfill site at Bandhwari on 04.05.2019 and evaluated the steps taken by the Concessionaire on the site. Thereafter issues were discussed in meetings with the Commissioner, MCG and Additional Municipal Commissioner, MCF. Chief Secretary reviewed the progress through video conferencing while Commissioner, MCG visited the site on multiple occasions. The following are the salient featured appearing from the interim report dated 25.05.2019 and the supplementary report dated 07.07.2019:*

(i) Three leachate storage tanks were functional at the time of filing the interim report dated 24.05.2019 and now all five leachate storage tanks are functional and leachate is being pumped out in those tanks.

(ii) Leachate treatment plant with the capacity 150 KLD has been installed but to attain the required parameters, additional DAF unit of 50 KLD fixed at the outlet of existing LTP on pilot basis. Current leachate of 13000 KL in the collection tanks is expected to be treated by 31.07.2020

(iii) Treatment of Legacy waste and fresh waste at the site: Installation of conveyor belt is in process and the Ballistic separator of capacity 500 TPD is going to be functional very shortly.

(iv) Waste accumulated at the landfill site has been reshaped and is being with HDPE lining so that rain water does not perforate within MSW to the excessive leachate. The covering of the waste by Concessionaire is likely to be completed by 15.07.2019.

11. Since unfortunately, the unsatisfactory state of affairs in dealing with the legacy waste is continuing not only at Gurugram and Faridabad but also at several places in the country which is one of the causes of large number of deaths and diseases, damage to the flora & fauna and the

environment. Pending prosecution of the polluters or the erring officers for their inaction or collusion and recovery of damages on 'Polluter Pays' principle, emergent measures are required to deal with the problem to prevent further damage.

12. *In the last week, on 05.07.2019, dealing with an identical problem from the State of Haryana (at Gohana, District Sonipat), the Tribunal observed[1]:*

> *" 3. The timeline proposed is in conflict with the statutory timelines under the SWM Rules, 2016. Such leisurely timeline is not only in conflict with the Rules but also at the cost of the environment. If such longer timeline is permitted unconditionally, the result will be that damage to the environment will continue. The timeline is also in violation of order of this Tribunal in O.A. No. 606/2018 passed in the presence of the Chief Secretary, Haryana on 06.03.2019, requiring that the entire State be made fully compliant with the Rules in maximum period of one year.*
>
> *4. Accordingly, we direct the Chief Secretary, Haryana to take remedial steps so that timeline of December 2021 for waste to energy plant is appropriately preponed. The Chief Secretary may indicate progress in this regard in the next report to be furnished to this Tribunal in O.A. No. 606/2018."*

13. *Consistent with the above direction, the present matter may also be dealt with by the Chief Secretary of Haryana accordingly. In the said monitoring, the issues inter alia to be considered may include steps to prevent burning of wastes particularly in the new sectors where collection of waste facility is not adequate, testing of samples of underground water to explore contamination and remedial steps required.*

14. *However, in view of continued damage to the environment and public health and long delay which has taken place in scientifically handling the legacy waste in question, we consider it necessary to give further direction in light of development which have come to light while dealing with other similar cases. There are reports that legacy waste has been successfully handled at Indore which fact was noticed in a recent order of the Tribunal dated 02.07.2019[2]:*

> *"In this regard, we have been informed during the hearing by Dr. A. B Akolkar, former Member Secretary, CPCB how the situation at Indore was*

[1] O.A 1011/2018
[2] O.A 113/2019

tackled. He has informed that 15 lakh MT old waste was dumped at Devguradiya in 100 acre area during 2016-17, (First Phase) 50,000 cum old waste was bio-mined and green belt developed in bio-mined area. Subsequently, in the second phase, 5,50,000 cum waste during 2017 was bio-mined. In the third phase, 9,00,000 cum of work was bio-mined in 2018 by employing more machinery. The machinery used for operations include; Trommels, Horizontal screens, excavators, back hoe loaders and dumpers. The recyclables recovered from the biomining process was sent for recycling, recyclable polythene was sent to cement plants and also for road making. The soil recovered was used for refilling the ground on the same site where greenery is developed. The recovered construction and demolition waste was recovered and sent to C&D processing facility to produce building materials. The leftover of the legacy waste was sent to secured landfill. Valuable land (80%) has been recovered by bio-remediation process of legacy waste."

15. *In view of the above, the Tribunal directed that legacy waste issue of Pirana landfill site in Ahmadabad city in Gujarat be dealt with on the Indore pattern.*

16. *We are of the view that present situation has also to be dealt with on the said pattern.*

17. ***Accordingly, we direct the State of Haryana to transfer a sum of Rs. 20 Crores to an ESCROW account with liberty to the State to recover the said amount from the concerned stakeholders in accordance with the Solid Waste Management Rules, 2016.***

18. ***We direct constitution of the following Committee to deal with the matter:***

- ***(1) Chief Secretary, Haryana, Chairman;***
- ***(2) Finance Secretary, Haryana, Member;***
- ***(3) Urban Local Bodies Secretary, Haryana, Member;***
- ***(4) Commissioner, Municipal Corporation, Faridabad, Member;***
- ***(5) Commissioner, Municipal Corporation, Gurugram, Member;***
- ***(6) Representative, CPCB, Member;***
- ***(7) Member Secretary, SPCB, Haryana, Member.***

The Secretary, Urban Local Bodies, Haryana, will be the nodal officer for coordination and compliance.

19. *The Committee may co-opt any other technical persons/agencies. After removing of legacy waste from the entire or part of the land, the State may consider using part of the recovered land for*

Integrated Waste Processing and Treatment Facility and also for Treatment, Storage and Disposal Facility (TSDF) for hazardous waste. At the periphery a bio-diversity park can be developed to improve the air quality and ambience. The Committee may have the Commissioner, Municipal Corporation, Indore ****or his nominee*** *as special* ****invitee****. The Committee may meet preferably within two weeks and after taking stock of the situation, plan to start further action within one month from today.*

20. The work already awarded may be taken into account and if necessary reviewed having regard to urgency of the situation. If Indore model is to be adopted, wholly or in part, no further tender process is necessary.

21. The legacy site may be cleared within six months. If the satisfactory progress is not made, the amount of the ESCROW account may be directed to be forfeited. The ESCROW account will be operated by the representative of CPCB. These directions will also be applicable to handling of ESCROW account directed to be created in terms of order dated 02.07.2019 in the State of Gujarat where the amount is Rs. 75 Crores and the same timeline will apply to Pirana also.

22. An interim report of the steps taken may be furnished to the Tribunal by the Secretary, Urban Local Bodies, Haryana within one month by e-mail at judicial-ngt@gov.in."

6. Accordingly, we have further considered the matter in the light of affidavit filed on behalf of Municipal Corporation, Gurgaon on 13.11.2019 with the effect that two trommels machines are being installed with the capacity of 300 TPD each which will work in double shifts. More machines will be installed as soon as more space will be available.

7. We are of the view that there is need to take further meaningful and prompt action by preparing an appropriate action plan and executing it so as to clear the legacy waste in shortest possible time but within six months. This timeline is being fixed in view of long time which has already gone in the process. It may be ensured that bio-remediation is carried out rather than mere mechanical separation. Failure to

comply may result in coercive action, including stoppage of salaries and entries in ACRs of concerned Municipal Commissioners. Municipal Commissioner, Gurgaon may file progress report as on 15.01.2020 by 20.01.2020 by e-mail at judicial-ngt@gov.in. CPCB may evaluate whether clearance of legacy is being done as per applicable guidelines and furnish a report before the next date by e-mail at judicial-ngt@gov.in.

8. Response to I.A No. 689/2019 filed by the applicant may also be furnished before the next date by the concerned authority.

A copy of this order be sent to CPCB by e-mail.

List for further consideration on 19.02.2020.

Adarsh Kumar Goel, CP

S.P Wangdi, JM

K. Ramakrishnan, JM

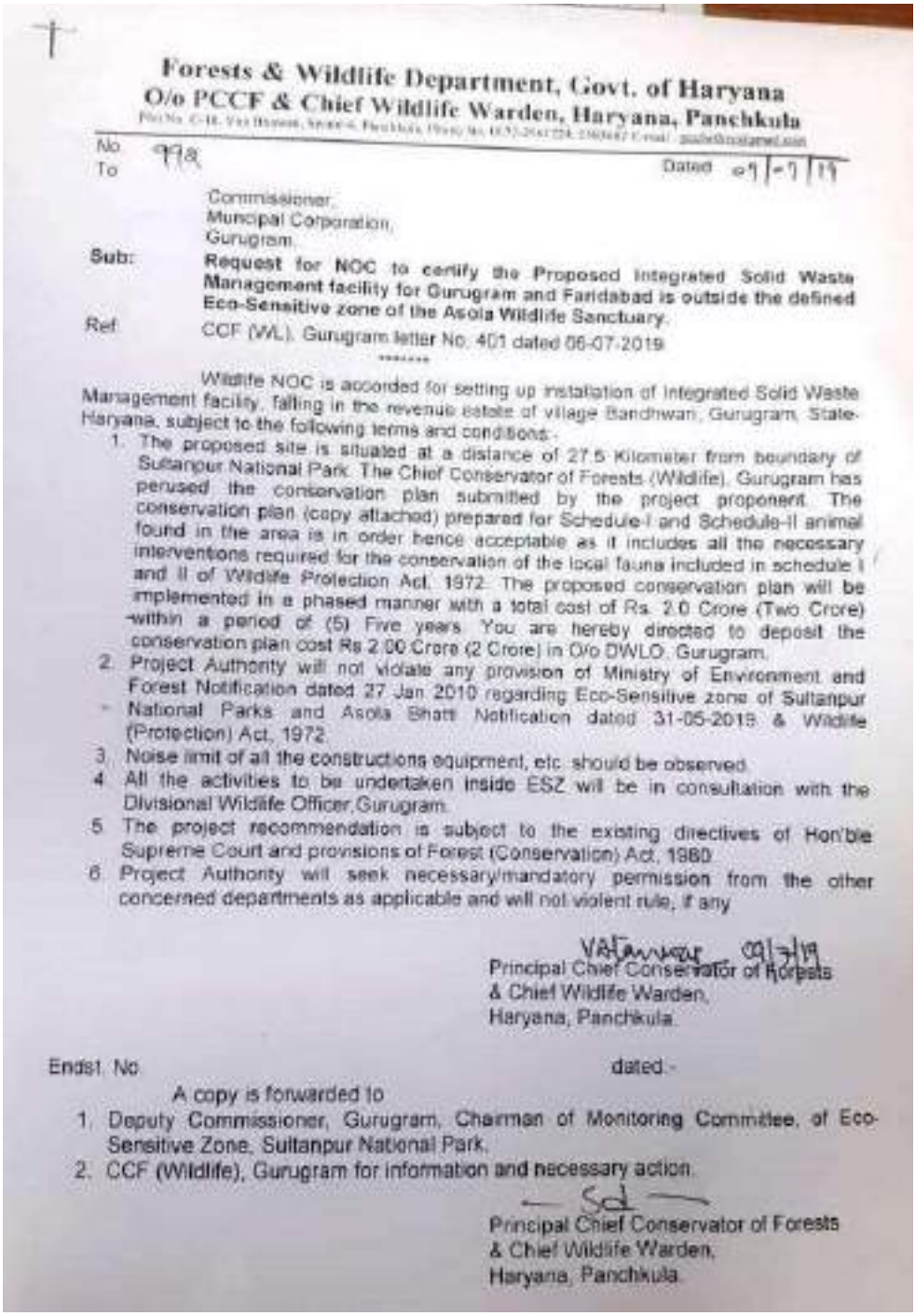
Dr. Nagin Nanda, EM

Saibal Dasgupta, EM

November 19, 2019
Original Application No. 514/2018
(Earlier O.A. No. 415/2015)
AK

ANNEXURE-VI

NOC & CLEARIFICATION LETTER FROM FOREST DEPT. AND WL



Forests & Wildlife Department, Govt. of Haryana
O/o PCCF & Chief Wildlife Warden, Haryana, Panchkula

No. 998
To

Dated 09-7-19

Commissioner,
Municipal Corporation,
Gurugram.

Sub: **Request for NOC to certify the Proposed Integrated Solid Waste Management facility for Gurugram and Faridabad is outside the defined Eco-Sensitive zone of the Asola Wildlife Sanctuary.**

Ref: CCF (WL), Gurugram letter No. 401 dated 06-07-2019

****

Wildlife NOC is accorded for setting up installation of Integrated Solid Waste Management facility, falling in the revenue estate of village Bandhwari, Gurugram, State-Haryana, subject to the following terms and conditions:-

1. The proposed site is situated at a distance of 27.5 Kilometer from boundary of Sultanpur National Park. The Chief Conservator of Forests (Wildlife), Gurugram has perused the conservation plan submitted by the project proponent. The conservation plan (copy attached) prepared for Schedule-I and Schedule-II animal found in the area is in order hence acceptable as it includes all the necessary interventions required for the conservation of the local fauna included in schedule I and II of Wildlife Protection Act, 1972. The proposed conservation plan will be implemented in a phased manner with a total cost of Rs. 2.0 Crore (Two Crore) within a period of (5) Five years. You are hereby directed to deposit the conservation plan cost Rs 2.00 Crore (2 Crore) in O/o DWLO, Gurugram.
2. Project Authority will not violate any provision of Ministry of Environment and Forest Notification dated 27 Jan 2010 regarding Eco-Sensitive zone of Sultanpur National Parks and Asola Bhatti Notification dated 31-05-2019 & Wildlife (Protection) Act, 1972.
3. Noise limit of all the constructions equipment, etc. should be observed.
4. All the activities to be undertaken inside ESZ will be in consultation with the Divisional Wildlife Officer,Gurugram.
5. The project recommendation is subject to the existing directives of Hon'ble Supreme Court and provisions of Forest (Conservation) Act, 1980.
6. Project Authority will seek necessary/mandatory permission from the other concerned departments as applicable and will not violent rule, if any.

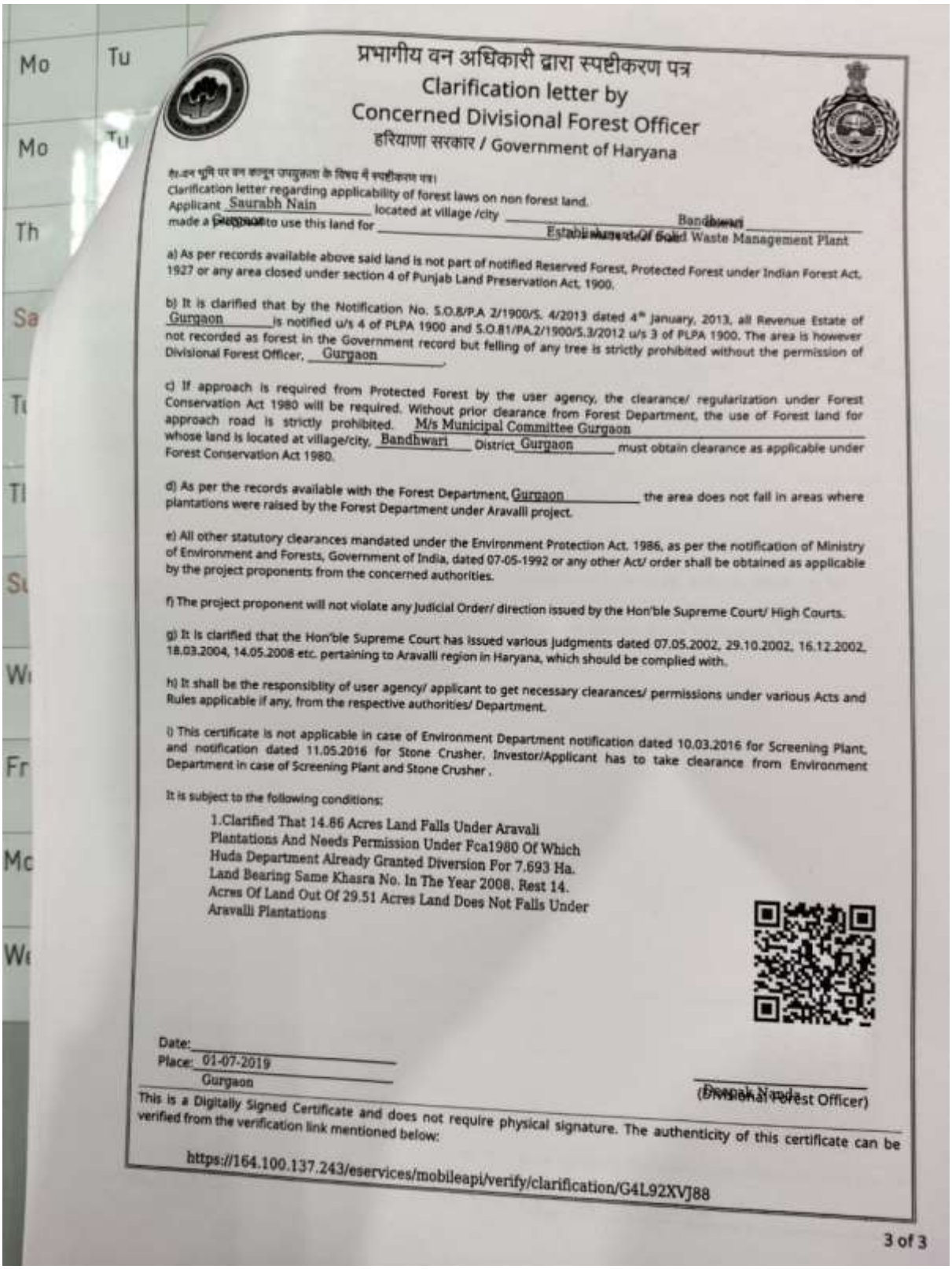
09/7/19
Principal Chief Conservator of Forests
& Chief Wildlife Warden,
Haryana, Panchkula.

Endst. No. dated.-

A copy is forwarded to

1. Deputy Commissioner, Gurugram, Chairman of Monitoring Committee, of Eco-Sensitive Zone, Sultanpur National Park.
2. CCF (Wildlife), Gurugram for information and necessary action.

Sd/-
Principal Chief Conservator of Forests
& Chief Wildlife Warden,
Haryana, Panchkula.



प्रभागीय वन अधिकारी द्वारा स्पष्टीकरण पत्र

Clarification letter by

Concerned Divisional Forest Officer

हरियाणा सरकार / Government of Haryana

क्षेत्र/वन भूमि पर वन कानून उपयुक्तता के विषय में स्पष्टीकरण पत्र।

Clarification letter regarding applicability of forest laws on non forest land.

Applicant Saurabh Nain located at village /city Bandhwari

made a request to use this land for Establishment of Solid Waste Management Plant

a) As per records available above said land is not part of notified Reserved Forest, Protected Forest under Indian Forest Act, 1927 or any area closed under section 4 of Punjab Land Preservation Act, 1900.

b) It is clarified that by the Notification No. S.O.8/P.A 2/1900/S. 4/2013 dated 4th January, 2013, all Revenue Estate of Gurgaon is notified u/s 4 of PLPA 1900 and S.O.81/PA.2/1900/S.3/2012 u/s 3 of PLPA 1900. The area is however not recorded as forest in the Government record but felling of any tree is strictly prohibited without the permission of Divisional Forest Officer, Gurgaon.

c) If approach is required from Protected Forest by the user agency, the clearance/ regularization under Forest Conservation Act 1980 will be required. Without prior clearance from Forest Department, the use of Forest land for approach road is strictly prohibited. M/s Municipal Committee Gurgaon whose land is located at village/city, Bandhwari District Gurgaon must obtain clearance as applicable under Forest Conservation Act 1980.

d) As per the records available with the Forest Department, Gurgaon the area does not fall in areas where plantations were raised by the Forest Department under Aravalli project.

e) All other statutory clearances mandated under the Environment Protection Act, 1986, as per the notification of Ministry of Environment and Forests, Government of India, dated 07-05-1992 or any other Act/ order shall be obtained as applicable by the project proponents from the concerned authorities.

f) The project proponent will not violate any Judicial Order/ direction issued by the Hon'ble Supreme Court/ High Courts.

g) It is clarified that the Hon'ble Supreme Court has issued various judgments dated 07.05.2002, 29.10.2002, 16.12.2002, 18.03.2004, 14.05.2008 etc. pertaining to Aravalli region in Haryana, which should be complied with.

h) It shall be the responsiblity of user agency/ applicant to get necessary clearances/ permissions under various Acts and Rules applicable if any, from the respective authorities/ Department.

i) This certificate is not applicable in case of Environment Department notification dated 10.03.2016 for Screening Plant, and notification dated 11.05.2016 for Stone Crusher. Investor/Applicant has to take clearance from Environment Department in case of Screening Plant and Stone Crusher .

It is subject to the following conditions:

1.Clarified That 14.86 Acres Land Falls Under Aravali Plantations And Needs Permission Under Fca1980 Of Which Huda Department Already Granted Diversion For 7.693 Ha. Land Bearing Same Khasra No. In The Year 2008. Rest 14. Acres Of Land Out Of 29.51 Acres Land Does Not Falls Under Aravalli Plantations

Date:

Place: 01-07-2019 Gurgaon

(Deepak Nanda Divisional Forest Officer)

This is a Digitally Signed Certificate and does not require physical signature. The authenticity of this certificate can be verified from the verification link mentioned below:

https://164.100.137.243/eservices/mobileapi/verify/clarification/G4L92XVJ88

3 of 3

ANNEXURE-VII

APPROVAL FROM GMDA FOR WATER INTAKE FOR PROJECT FROM STP

GMDA

OFFICE OF THE EXECUTIVE ENGINEER, S&S DIVISION –II, GMDA, GURUGRAM

Address : Plot No. 44, Sector -32, Gurugram, E-mail-xengn2@gmail.com & xen.gmda@gov.in

To

M/s Ecogreen Energy Gurgaon Faridabad Pvt. Ltd.,
603 – 607, ILD Trade Centre, Sector – 47,
Sohna Road, Gurugram

Memo No. GMDA/S&S/2018/575 Dated. 24/05/2018

Sub:- **Treated water connection permission for waste to Energy Plant over 30.50 acre in Bandhwari, Gurugram developed by M/s Ecogreen Energy Gurgaon Faridabad Pvt. Ltd.**

Ref:- **Your Office letter dated 03.05.2018 & 22.05.2018.**

On the above cited subject, the permission for connection in Recycle treated water pipe line for supply of 4 MLD treated water to Energy Plant over 30.50 acre in Bandhwari, Gurugram will be accorded after depositing the following charges through On-line payment in GMDA Current Account in ICICI Bank bearing IFSC code ICIC0001031 and Account No. 103105003176 :-

1.	Connection Security (Refundable)	Rs. 5.00 lacs
2.	Connection Fees (Non Refundable)	Rs. 2.00 lacs
		Rs. 7.00 lacs

Further the monthly charges for supply of treated water shall be Rs. 3/- Per KL. The above charges and tariff are according to HSVP notification dated 12th January 2018, circulated vide CA, HSVP No. 14907-910 dated 23.01.2018.

It is intimated that treated water pipe line of dia 500mm is available for connection at Southern Peripheral Road (SPR) junction with Master Road between sector-58/61 Gurugram and further the pipe line upto Energy Plant over 30.50 acre in Bandhwari, Gurugram will be laid by the your firm at own expenses and the permissions from concerned department will also be obtained by you.

You are also requested to install the online booster & water meter at connection point for smooth supply of treated water at plant. It is also requested to submit the details for size of connection pipe and layout plan with showing the location of On line booster and route of pipe line from connection point to your plant.

The final permission for connection will be accorded after depositing of above charges and above details. It is also requested to revise the affidavit on the name of GMDA instead of HUDA/HSVP and it should be mentioned in the affidavit that the necessary instructions/guidelines shall be followed by you regarding the use of Recycled water and no tapping will be allowed as the recycled water is not fit for drinking purpose.

24/5/18

Executive Engineer -II
S&S Division, GMDA
Gurugram

Endst No. GMDA/S&S/2018/580-581 **Dated.** 24/05/2018

A copy of the above is forwarded to the following for kind information please:-

1. The Superintending Engineer-II, GMDA, Gurugram w.r.t his office letter dated 18.05.2018 and your office E-mail on dt. 23.05.2018 at 10:12 AM.
2. The Sub Divisional Engineer, HSVP, Sub Division No. V, Gurugram w.r.t. his office letter No. 97978 Dt. 15.05.2018.

24/5/18

Executive Engineer -II
S&S Division, GMDA
Gurugram

58

ANNEXURE-VIII

LABORATORY ANALYSIS RESULTS OF BASELINE STUDY OF SITE & STUDY ARAE

Ambient Air Results

Wolkem INDIA LIMITED

Laboratory : E- 102, Mewar Industrial Area, Madri, Udaipur - 313003, Rajasthan (INDIA)
Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com
www.wolkem.com

Date: - 11.01.2021

TEST REPORT
(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Project Site (A1)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2(µg/m3)	NO_2 (µg/m3)	CO (mg/m³)	Ozone µg/M3	NH3 (µg/M3)
1.	01.10.2020	20201030171	285.36	136.26	18.5	70.9	1.29	44.26	45.11
2.	05.10.2020	20201030179	285.20	122.45	16.3	66.4	1.05	29.79	37.78
3.	08.10.2020	20201030187	287.16	144.20	18.5	66.8	1.29	23.63	36.09
4.	12.10.2020	20201030195	275.59	122.95	17.7	65.9	1.41	17.90	62.02
5.	15.10.2020	20201030203	281.71	136.26	14.6	62.9	1.05	32.08	42.29
6.	19.10.2020	20201030211	308.42	116.00	13.7	66.6	1.05	16.61	50.18
7.	22.10.2020	20201030219	256.37	114.11	20.1	74.2	1.4	16.47	37.78
8.	26.10.2020	20201030227	281.71	111.79	14.0	65.9	1.51	19.34	45.11
9.	29.10.2020	20201127035	277.63	115.83	14.5	71.0	1.43	19.77	49.05
10.	02.11.2020	20201127043	278.21	126.62	14.8	70.2	1.14	30.22	36.65
11.	05.11.2020	20201127051	310.94	120.95	19.4	71.3	1.87	35.09	48.49
12.	09.11.2020	20201127059	312.69	107.11	19.9	70.4	1.64	37.95	43.42
13.	12.11.2020	20201127067	226.21	116.45	18.7	61.8	1.92	32.94	54.13
14.	16.11.2020	20201127075	240.94	123.74	18.4	70.5	2.1	43.11	53.56
15.	19.11.2020	20201127083	329.35	110.10	17.2	65.2	2.01	43.54	55.26
16.	23.11.2020	20201127091	236.10	118.16	16.5	65.8	1.81	43.97	62.02
17.	26.11.2020	20210101017	336.57	120.85	15.1	61.0	1.35	44.54	58.07
18.	30.11.2020	20210101025	249.36	98.98	18.8	60.4	1.34	42.68	59.77
19.	03.12.2020	20210101033	341.30	130.16	15.7	61.1	1.41	36.81	61.46
20.	07.12.2020	20210101041	355.03	112.76	19.2	69.0	1.52	38.38	55.82
21.	10.12.2020	20210101049	261.00	113.76	17.2	64.5	1.36	28.36	53.00
22.	14.12.2020	20210101057	326.92	122.01	18.1	69.4	1.47	28.50	55.26
23.	17.12.2020	20210101065	232.45	126.51	19.7	68.5	1.34	44.40	57.51
24.	21.12.2020	20210101073	246.53	136.01	18.6	74.0	1.28	39.82	59.20
25.	24.12.2020	20210101081	350.88	126.51	17.1	71.5	1.21	41.39	60.33
26.	28.12.2020	20210101089	353.72	133.50	16.7	70.6	1.17	40.25	60.89

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m³)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	289.51	121.69	17.26	67.52	1.44	33.53	51.55
Geometric Mean	286.87	121.27	17.15	67.41	1.41	31.95	50.81
STD. GEO. Devn. (24 Hrs)	39.94	10.38	1.94	3.98	0.29	9.66	8.57
Max. Concentration	355.03	144.20	20.07	74.19	2.10	44.54	62.02
Min. Concentration	226.21	98.98	13.67	60.41	1.05	16.47	36.09
98% PERCENTILE VALUES	354.37	140.23	19.99	74.09	2.06	44.47	62.02
CPCB norms (µg/m3)	100	60	80	80	4	100	400

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide Gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.officer@wolkem.com,lab.khalasi@wolkem.com
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5. The samples will be destroyed after 15 days from the date of issue of certificate unless otherwise specified.
6. Complaints, if any, should be reported within 15 days.

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Wolkem INDIA LIMITED

Laboratory : E- 102, Mewar Industrial Area, Madri, Udaipur - 313003, Rajasthan (INDIA)

Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com

Date: 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Project Site (A1)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	01.10.2020	20201030171	<0.05	<5	<1.0	1.30	<0.2	0.65	<0.05	BDL	BDL	BDL
2.	05.10.2020	20201030179	<0.05	<5	<1.0	1.21	<0.2	0.69	<0.05	BDL	BDL	BDL
3.	08.10.2020	20201030187	<0.05	<5	<1.0	1.45	<0.2	0.71	<0.05	BDL	BDL	BDL
4.	12.10.2020	20201030195	<0.05	<5	<1.0	1.11	<0.2	0.74	<0.05	BDL	BDL	BDL
5.	15.10.2020	20201030203	<0.05	<5	<1.0	1.28	<0.2	0.68	<0.05	BDL	BDL	BDL
6.	19.10.2020	20201030211	<0.05	<5	<1.0	1.29	<0.2	0.75	<0.05	BDL	BDL	BDL
7.	22.10.2020	20201030219	<0.05	<5	<1.0	1.34	<0.2	0.80	<0.05	BDL	BDL	BDL
8.	26.10.2020	20201030227	<0.05	<5	<1.0	1.50	<0.2	0.82	<0.05	BDL	BDL	BDL
9.	29.10.2020	20201127035	<0.05	<5	<1.0	1.65	<0.2	0.76	<0.05	BDL	BDL	BDL
10.	02.11.2020	20201127043	<0.05	<5	<1.0	1.58	<0.2	0.65	<0.05	BDL	BDL	BDL
11.	05.11.2020	20201127051	<0.05	<5	<1.0	1.74	<0.2	0.59	<0.05	BDL	BDL	BDL
12.	09.11.2020	20201127059	<0.05	<5	<1.0	1.35	<0.2	0.66	<0.05	BDL	BDL	BDL
13.	12.11.2020	20201127067	<0.05	<5	<1.0	1.32	<0.2	0.65	<0.05	BDL	BDL	BDL
14.	16.11.2020	20201127075	<0.05	<5	<1.0	1.25	<0.2	0.51	<0.05	BDL	BDL	BDL
15.	19.11.2020	20201127083	<0.05	<5	<1.0	1.41	<0.2	0.48	<0.05	BDL	BDL	BDL
16.	23.11.2020	20201127091	<0.05	<5	<1.0	1.48	<0.2	0.58	<0.05	BDL	BDL	BDL
17.	26.11.2020	20210101017	<0.05	<5	<1.0	1.51	<0.2	0.65	<0.05	BDL	BDL	BDL
18.	30.11.2020	20210101025	<0.05	<5	<1.0	1.60	<0.2	0.63	<0.05	BDL	BDL	BDL
19.	03.12.2020	20210101033	<0.05	<5	<1.0	1.64	<0.2	0.72	<0.05	BDL	BDL	BDL
20.	07.12.2020	20210101041	<0.05	<5	<1.0	1.15	<0.2	0.75	<0.05	BDL	BDL	BDL
21.	10.12.2020	20210101049	<0.05	<5	<1.0	1.23	<0.2	0.68	<0.05	BDL	BDL	BDL
22.	14.12.2020	20210101057	<0.05	<5	<1.0	1.32	<0.2	0.64	<0.05	BDL	BDL	BDL
23.	17.12.2020	20210101065	<0.05	<5	<1.0	1.38	<0.2	0.76	<0.05	BDL	BDL	BDL
24.	21.12.2020	20210101073	<0.05	<5	<1.0	1.36	<0.2	0.74	<0.05	BDL	BDL	BDL
25.	24.12.2020	20210101081	<0.05	<5	<1.0	1.47	<0.2	0.81	<0.05	BDL	BDL	BDL
26.	28.12.2020	20210101089	<0.05	<5	<1.0	1.42	<0.2	0.80	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	1.40	<0.2	0.69	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	1.39	<0.2	0.68	<0.05	BDL	BDL	BDL
STD. GEO. Devn. (24 Hrs)	<0.05	<5	<1.0	0.16	<0.2	0.09	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	1.74	<0.2	0.82	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	1.11	<0.2	0.48	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	1.70	<0.2	0.82	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1	20	06	05	1	--	0.36	--	--	--

Tested By

(Leena Sharma)
Asst. Chemist

Authorized Signatory

(Dr. S.K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. [illegible]
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com, [illegible]@wolkem.com
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www.wolkem.com

Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Bandhwari Village (A2)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2(µg/m3)	NO_2 (µg/m3)	CO (mg/m³)	Ozone µg/M3	NH3 (µg/M3)
1.	01.10.2020	20201030172	299.52	127.92	14.3	55.3	1.24	32.80	50.75
2.	05.10.2020	20201030180	279.73	117.71	16.9	53.8	1.13	24.06	36.65
3.	08.10.2020	20201030188	301.33	113.60	12.3	47.6	1.14	22.49	42.85
4.	12.10.2020	20201030196	269.05	124.43	15.8	37.3	1.25	20.34	42.29
5.	15.10.2020	20201030204	303.38	121.60	14.8	50.1	1.48	29.36	41.16
6.	19.10.2020	20201030212	282.39	117.37	16.5	41.6	1.74	22.63	43.42
7.	22.10.2020	20201030220	289.72	130.49	13.0	48.6	1.65	20.34	51.31
8.	26.10.2020	20201030228	266.95	126.63	11.9	40.4	1.89	23.92	42.29
9.	29.10.2020	20201127036	280.22	117.46	13.5	48.9	1.52	20.48	55.82
10.	02.11.2020	20201127044	304.10	122.76	16.1	50.2	1.88	21.05	54.13
11.	05.11.2020	20201127052	275.83	123.74	12.0	52.7	2.11	20.77	53.00
12.	09.11.2020	20201127060	289.71	130.13	15.3	49.7	1.42	21.48	51.31
13.	12.11.2020	20201127068	299.91	128.76	13.8	46.7	1.67	22.63	50.18
14.	16.11.2020	20201127076	282.13	124.91	16.6	34.80	1.24	23.35	47.93
15.	19.11.2020	20201127084	284.43	124.56	12.9	47.6	1.41	23.92	55.82
16.	23.11.2020	20201127092	273.35	121.53	11.8	43.1	0.98	28.65	56.38
17.	26.11.2020	20210101018	296.73	129.19	14.4	36.0	1.24	31.51	62.02
18.	30.11.2020	20210101026	286.06	116.89	16.4	48.8	1.26	30.08	65.40
19.	03.12.2020	20210101034	295.01	114.59	12.6	36.8	1.57	30.22	50.75
20.	07.12.2020	20210101042	273.48	113.64	16.2	48.6	1.74	26.78	42.85
21.	10.12.2020	20210101050	296.53	117.83	14.9	46.5	1.52	26.50	41.72
22.	14.12.2020	20210101058	292.71	127.83	16.4	36.7	1.32	26.93	36.65
23.	17.12.2020	20210101066	288.12	126.08	12.8	41.1	1.25	27.93	42.85
24.	21.12.2020	20210101074	264.01	126.88	16.1	45.6	1.09	30.08	47.93
25.	24.12.2020	20210101082	287.92	119.92	12.3	42.2	1.35	29.07	50.75
26.	28.12.2020	20210101090	280.40	116.88	11.2	47.7	1.38	29.07	57.51

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m³)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	286.26	122.44	14.27	45.32	1.44	25.63	48.99
Geometric Mean	286.03	122.32	14.16	42.32	1.42	25.34	48.45
STD.GEO.Devn. (24 Hrs)	11.52	5.35	1.82	9.26	0.28	3.94	7.43
Max. Concentration	304.10	130.49	16.89	55.34	2.11	32.80	65.40
Min. Concentration	264.01	113.60	11.24	7.25	0.98	20.34	36.65
98% PERCENTILE VALUES	303.74	130.31	16.74	54.55	2.00	32.15	63.71
CPCB norms (µg/m3)	100	60	80	80	4	100	400

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.offic[illegible]wolkem.com/hr.sharda@wolkem.com
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6. [illegible] results should be reported within 15 days.

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www.wolkem.com

Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Bandhwari Village (A2)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	01.10.2020	20201030172	<0.05	<5	<1.0	1.32	<0.2	0.65	<0.05	BDL	BDL	BDL
2.	05.10.2020	20201030180	<0.05	<5	<1.0	1.42	<0.2	0.7	<0.05	BDL	BDL	BDL
3.	08.10.2020	20201030188	<0.05	<5	<1.0	1.47	<0.2	0.62	<0.05	BDL	BDL	BDL
4.	12.10.2020	20201030196	<0.05	<5	<1.0	1.35	<0.2	0.64	<0.05	BDL	BDL	BDL
5.	15.10.2020	20201030204	<0.05	<5	<1.0	1.52	<0.2	0.71	<0.05	BDL	BDL	BDL
6.	19.10.2020	20201030212	<0.05	<5	<1.0	1.60	<0.2	0.7	<0.05	BDL	BDL	BDL
7.	22.10.2020	20201030220	<0.05	<5	<1.0	1.70	<0.2	0.58	<0.05	BDL	BDL	BDL
8.	26.10.2020	20201030228	<0.05	<5	<1.0	1.57	<0.2	0.51	<0.05	BDL	BDL	BDL
9.	29.10.2020	20201127036	<0.05	<5	<1.0	1.42	<0.2	0.6	<0.05	BDL	BDL	BDL
10.	02.11.2020	20201127044	<0.05	<5	<1.0	1.25	<0.2	0.6	<0.05	BDL	BDL	BDL
11.	05.11.2020	20201127052	<0.05	<5	<1.0	1.34	<0.2	0.54	<0.05	BDL	BDL	BDL
12.	09.11.2020	20201127060	<0.05	<5	<1.0	1.33	<0.2	0.61	<0.05	BDL	BDL	BDL
13.	12.11.2020	20201127068	<0.05	<5	<1.0	1.47	<0.2	0.52	<0.05	BDL	BDL	BDL
14.	16.11.2020	20201127076	<0.05	<5	<1.0	1.42	<0.2	0.54	<0.05	BDL	BDL	BDL
15.	19.11.2020	20201127084	<0.05	<5	<1.0	1.54	<0.2	0.7	<0.05	BDL	BDL	BDL
16.	23.11.2020	20201127092	<0.05	<5	<1.0	1.58	<0.2	0.67	<0.05	BDL	BDL	BDL
17.	26.11.2020	20210101018	<0.05	<5	<1.0	1.48	<0.2	0.64	<0.05	BDL	BDL	BDL
18.	30.11.2020	20210101026	<0.05	<5	<1.0	1.32	<0.2	0.51	<0.05	BDL	BDL	BDL
19.	03.12.2020	20210101034	<0.05	<5	<1.0	1.36	<0.2	0.54	<0.05	BDL	BDL	BDL
20.	07.12.2020	20210101042	<0.05	<5	<1.0	1.48	<0.2	0.62	<0.05	BDL	BDL	BDL
21.	10.12.2020	20210101050	<0.05	<5	<1.0	1.43	<0.2	0.68	<0.05	BDL	BDL	BDL
22.	14.12.2020	20210101058	<0.05	<5	<1.0	1.54	<0.2	0.58	<0.05	BDL	BDL	BDL
23.	17.12.2020	20210101066	<0.05	<5	<1.0	1.60	<0.2	0.56	<0.05	BDL	BDL	BDL
24.	21.12.2020	20210101074	<0.05	<5	<1.0	1.62	<0.2	0.54	<0.05	BDL	BDL	BDL
25.	24.12.2020	20210101082	<0.05	<5	<1.0	1.25	<0.2	0.62	<0.05	BDL	BDL	BDL
26.	28.12.2020	20210101090	<0.05	<5	<1.0	1.21	<0.2	0.7	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	1.45	<0.2	0.61	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	1.44	<0.2	0.61	<0.05	BDL	BDL	BDL
STD. GEO. Devn. (24 Hrs)	<0.05	<5	<1.0	0.13	<0.2	0.07	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	1.70	<0.2	0.71	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	1.21	<0.2	0.51	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	1.66	<0.2	0.71	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1.0	20	06	05	1.0	--	0.36	--	--	--

Tested By

(Leena Sharma)
Asst. Chemist

Authorized Signatory

(Dr. S.K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note

1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986 vide gazette notification no. [illegible]
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com/om.ghodela@wolkem.com
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www.wolkem.com

Date: - 11.01.2021

TEST REPORT
(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Mandi Village (A3)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2(µg/m3)	NO_2 (µg/m3)	CO (mg/m^3)	Ozone µg/M3	NH3 (µg/M3)
1.	01.10.2020	20201030173	298.33	129.78	19.1	51.7	1.61	14.47	51.31
2.	05.10.2020	20201030181	293.71	123.06	12.0	34.4	1.15	16.18	46.23
3.	08.10.2020	20201030189	316.85	136.85	16.9	45.7	2.17	30.22	46.80
4.	12.10.2020	20201030197	294.70	122.05	13.1	28.5	1.03	26.50	51.31
5.	15.10.2020	20201030205	315.45	134.66	16.3	43.1	0.92	26.78	42.85
6.	19.10.2020	20201030213	292.41	129.44	11.1	33.6	1.25	26.35	41.16
7.	22.10.2020	20201030221	302.05	125.42	17.4	57.4	1.32	19.34	43.42
8.	26.10.2020	20201030229	306.55	131.86	12.5	36.9	1.14	22.20	45.11
9.	29.10.2020	20201127037	307.22	129.08	12.2	54.7	1.12	20.77	43.98
10.	02.11.2020	20201127045	303.70	126.20	16.7	35.0	1.08	20.48	45.67
11.	05.11.2020	20201127053	303.10	122.91	13.5	44.5	1.26	20.91	46.23
12.	09.11.2020	20201127061	303.50	123.69	16.6	28.7	1.18	21.91	48.49
13.	12.11.2020	20201127069	305.15	129.70	10.9	43.9	1.13	21.34	50.75
14.	16.11.2020	20201127077	307.12	129.76	17.7	35.1	1.24	18.48	55.82
15.	19.11.2020	20201127085	311.75	123.38	11.6	55.0	1.21	22.34	50.18
16.	23.11.2020	20201127093	312.65	124.92	19.2	40.2	1.31	18.19	54.69
17.	26.11.2020	20210101019	317.80	128.53	13.8	31.4	1.17	17.62	56.38
18.	30.11.2020	20210101027	304.64	126.03	12.3	45.8	1.07	21.77	57.51
19.	03.12.2020	20210101035	309.88	124.80	16.4	33.8	0.95	14.32	42.85
20.	07.12.2020	20210101043	303.20	134.78	13.2	58.7	0.87	14.18	45.67
21.	10.12.2020	20210101051	303.48	130.62	16.6	37.2	1.11	22.06	51.87
22.	14.12.2020	20210101059	306.80	126.08	11.1	53.5	1.01	17.90	41.72
23.	17.12.2020	20210101067	306.81	128.89	19.8	34.2	0.94	16.04	58.64
24.	21.12.2020	20210101075	313.08	126.16	12.1	44.8	0.98	31.08	55.82
25.	24.12.2020	20210101083	307.60	126.20	16.7	29.7	1.01	21.91	42.85
26.	28.12.2020	20210101091	309.76	130.25	14.0	32.4	0.89	18.91	43.98

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m^3)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	306.05	127.89	14.72	41.15	1.16	20.86	48.51
Geometric Mean	305.98	127.83	14.47	40.15	1.14	20.40	48.23
STD.GEO.Devn. (24 Hrs)	6.59	3.89	2.80	9.42	0.26	4.51	5.40
Max. Concentration	317.80	136.85	19.78	58.69	2.17	31.08	58.64
Min. Concentration	292.41	122.05	10.89	28.54	0.87	14.18	41.16
98% PERCENTILE VALUES	317.33	135.81	19.48	58.05	1.89	30.65	58.07
CPCB norms (µg/m3)	100	60	80	80	4	100	400

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.offi[illegible]@wolkem.com/om.sharma@wolkem.com
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OHSAS Certificate No. 52024-A111

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Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com

www.wolkem.com

Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Mandi Village (A3)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	01.10.2020	20201030172	<0.05	<5	<1.0	0.62	<0.2	0.54	<0.05	BDL	BDL	BDL
2.	05.10.2020	20201030180	<0.05	<5	<1.0	0.64	<0.2	0.58	<0.05	BDL	BDL	BDL
3.	08.10.2020	20201030188	<0.05	<5	<1.0	0.70	<0.2	0.48	<0.05	BDL	BDL	BDL
4.	12.10.2020	20201030196	<0.05	<5	<1.0	0.52	<0.2	0.58	<0.05	BDL	BDL	BDL
5.	15.10.2020	20201030204	<0.05	<5	<1.0	0.69	<0.2	0.42	<0.05	BDL	BDL	BDL
6.	19.10.2020	20201030212	<0.05	<5	<1.0	0.70	<0.2	0.45	<0.05	BDL	BDL	BDL
7.	22.10.2020	20201030220	<0.05	<5	<1.0	0.74	<0.2	0.6	<0.05	BDL	BDL	BDL
8.	26.10.2020	20201030228	<0.05	<5	<1.0	0.72	<0.2	0.62	<0.05	BDL	BDL	BDL
9.	29.10.2020	20201127036	<0.05	<5	<1.0	0.78	<0.2	0.57	<0.05	BDL	BDL	BDL
10.	02.11.2020	20201127044	<0.05	<5	<1.0	0.81	<0.2	0.49	<0.05	BDL	BDL	BDL
11.	05.11.2020	20201127052	<0.05	<5	<1.0	0.82	<0.2	0.51	<0.05	BDL	BDL	BDL
12.	09.11.2020	20201127060	<0.05	<5	<1.0	0.62	<0.2	0.53	<0.05	BDL	BDL	BDL
13.	12.11.2020	20201127068	<0.05	<5	<1.0	0.68	<0.2	0.6	<0.05	BDL	BDL	BDL
14.	16.11.2020	20201127076	<0.05	<5	<1.0	0.65	<0.2	0.55	<0.05	BDL	BDL	BDL
15.	19.11.2020	20201127084	<0.05	<5	<1.0	0.74	<0.2	0.54	<0.05	BDL	BDL	BDL
16.	23.11.2020	20201127092	<0.05	<5	<1.0	0.72	<0.2	0.57	<0.05	BDL	BDL	BDL
17.	26.11.2020	20210101018	<0.05	<5	<1.0	0.68	<0.2	0.48	<0.05	BDL	BDL	BDL
18.	30.11.2020	20210101026	<0.05	<5	<1.0	0.84	<0.2	0.5	<0.05	BDL	BDL	BDL
19.	03.12.2020	20210101034	<0.05	<5	<1.0	0.86	<0.2	0.47	<0.05	BDL	BDL	BDL
20.	07.12.2020	20210101042	<0.05	<5	<1.0	0.92	<0.2	0.44	<0.05	BDL	BDL	BDL
21.	10.12.2020	20210101050	<0.05	<5	<1.0	0.68	<0.2	0.57	<0.05	BDL	BDL	BDL
22.	14.12.2020	20210101058	<0.05	<5	<1.0	0.63	<0.2	0.47	<0.05	BDL	BDL	BDL
23.	17.12.2020	20210101066	<0.05	<5	<1.0	0.54	<0.2	0.6	<0.05	BDL	BDL	BDL
24.	21.12.2020	20210101074	<0.05	<5	<1.0	0.51	<0.2	0.6	<0.05	BDL	BDL	BDL
25.	24.12.2020	20210101082	<0.05	<5	<1.0	0.92	<0.2	0.53	<0.05	BDL	BDL	BDL
26.	28.12.2020	20210101090	<0.05	<5	<1.0	0.75	<0.2	0.5	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	0.71	<0.2	0.53	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	0.70	<0.2	0.53	<0.05	BDL	BDL	BDL
STD. GEO. Devn. (24 Hrs)	<0.05	<5	<1.0	0.11	<0.2	0.06	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	0.92	<0.2	0.62	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	0.51	<0.2	0.42	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	0.92	<0.2	0.61	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1.0	20	06	[illegible]	1.0	--	0.36	--	--	--

Tested By

(Leena Sharma)
Asst. Chemist

Authorized Signatory

(Dr. S.K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note

1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. [illegible]
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Date: - 11.01.2021

TEST REPORT
(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Dhankuwal Johar (A4)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2(µg/m3)	NO_2 (µg/m3)	CO (mg/m^3)	Ozone µg/M3	NH3 (µg/M3)
1.	02.10.2020	20201030174	160.40	98.22	15.3	35.9	1.04	31.51	50.75
2.	06.10.2020	20201030182	108.25	66.72	9.4	25.8	0.74	16.76	53.56
3.	09.10.2020	20201030190	139.27	69.09	14.4	31.5	0.85	43.11	56.38
4.	13.10.2020	20201030198	130.14	82.74	9.5	27.0	0.92	16.18	62.02
5.	16.10.2020	20201030206	111.07	74.31	16.0	36.9	1.04	26.64	68.22
6.	20.10.2020	20201030214	105.07	63.92	15.0	28.2	0.94	23.35	55.82
7.	23.10.2020	20201030222	148.44	97.87	10.2	38.0	0.88	22.06	45.11
8.	27.10.2020	20201030230	116.23	74.40	11.5	30.5	1.03	23.20	43.42
9.	30.10.2020	20201127038	139.18	71.60	9.8	30.2	0.95	30.08	41.72
10.	03.11.2020	20201127046	140.28	83.04	16.2	25.4	0.74	42.97	49.05
11.	06.11.2020	20201127054	112.56	63.42	15.1	32.7	1.1	44.40	49.62
12.	10.11.2020	20201127062	128.78	69.36	15.1	24.5	0.95	44.40	69.35
13.	13.11.2020	20201127070	128.47	91.47	9.4	34.4	0.74	42.82	70.48
14.	17.11.2020	20201127078	137.71	79.14	16.9	26.8	0.89	25.06	63.71
15.	20.11.2020	20201127086	108.31	78.29	13.3	39.4	0.94	14.32	64.84
16.	24.11.2020	20201127094	121.31	69.00	9.6	25.4	0.84	27.79	60.33
17.	27.11.2020	20210101020	129.16	75.38	14.8	32.4	0.97	32.94	64.84
18.	01.12.2020	20210101028	133.44	77.20	13.1	27.5	0.95	45.83	67.66
19.	04.12.2020	20210101036	141.46	69.50	16.4	37.8	0.81	46.41	69.35
20.	08.12.2020	20210101036	143.53	78.25	14.0	28.7	1.01	46.83	56.38
21.	11.12.2020	20210101052	124.68	73.32	14.8	37.7	0.74	39.53	55.82
22.	15.12.2020	20210101060	114.35	67.44	15.3	30.7	1.08	25.21	68.22
23.	18.12.2020	20210101068	112.25	67.98	12.0	30.0	0.81	28.36	48.49
24.	22.12.2020	20210101076	135.30	83.15	11.2	34.1	0.81	39.53	49.62
25.	25.12.2020	20210101084	128.25	87.86	13.3	31.5	0.67	38.38	55.26
26.	29.12.2020	20210101092	107.16	67.67	11.8	26.3	0.5	42.97	53.00

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m^3)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	127.12	76.17	13.21	31.13	0.88	33.10	57.42
Geometric Mean	126.31	75.61	12.97	30.82	0.87	31.31	56.76
STD.GEO.Devn. (24 Hrs)	14.63	9.66	2.48	4.52	0.14	10.46	8.79
Max. Concentration	160.40	98.22	16.92	39.42	1.10	46.83	70.48
Min. Concentration	105.07	63.42	9.37	24.54	0.50	14.32	41.72
98% PERCENTILE VALUES	154.42	98.04	16.65	38.70	1.09	46.62	69.92
CPCB norms (µg/m3)	100	60	80	80	4	100	400

Note
1. MoEFCC, New Delhi recognition under the Environment(Protection) Act,1986 vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.wcs@wolkem.com/om.gupta@wolkem.com
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Date: - 11.01.2021

TEST REPORT
(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Dhankuwal Johar (A4)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	02.10.2020	20201030174	<0.05	<5	<1.0	0.58	<0.2	0.41	<0.05	BDL	BDL	BDL
2.	06.10.2020	20201030182	<0.05	<5	<1.0	0.62	<0.2	0.47	<0.05	BDL	BDL	BDL
3.	09.10.2020	20201030190	<0.05	<5	<1.0	0.67	<0.2	0.45	<0.05	BDL	BDL	BDL
4.	13.10.2020	20201030198	<0.05	<5	<1.0	0.79	<0.2	0.50	<0.05	BDL	BDL	BDL
5.	16.10.2020	20201030206	<0.05	<5	<1.0	0.74	<0.2	0.49	<0.05	BDL	BDL	BDL
6.	20.10.2020	20201030214	<0.05	<5	<1.0	0.97	<0.2	0.38	<0.05	BDL	BDL	BDL
7.	23.10.2020	20201030222	<0.05	<5	<1.0	0.84	<0.2	0.33	<0.05	BDL	BDL	BDL
8.	27.10.2020	20201030230	<0.05	<5	<1.0	1.10	<0.2	0.31	<0.05	BDL	BDL	BDL
9.	30.10.2020	20201127038	<0.05	<5	<1.0	1.15	<0.2	0.34	<0.05	BDL	BDL	BDL
10.	03.11.2020	20201127046	<0.05	<5	<1.0	0.95	<0.2	0.44	<0.05	BDL	BDL	BDL
11.	06.11.2020	20201127054	<0.05	<5	<1.0	0.92	<0.2	0.47	<0.05	BDL	BDL	BDL
12.	10.11.2020	20201127062	<0.05	<5	<1.0	0.68	<0.2	0.48	<0.05	BDL	BDL	BDL
13.	13.11.2020	20201127070	<0.05	<5	<1.0	0.84	<0.2	0.33	<0.05	BDL	BDL	BDL
14.	17.11.2020	20201127078	<0.05	<5	<1.0	0.71	<0.2	0.50	<0.05	BDL	BDL	BDL
15.	20.11.2020	20201127086	<0.05	<5	<1.0	0.84	<0.2	0.61	<0.05	BDL	BDL	BDL
16.	24.11.2020	20201127094	<0.05	<5	<1.0	0.62	<0.2	0.54	<0.05	BDL	BDL	BDL
17.	27.11.2020	20210101020	<0.05	<5	<1.0	0.71	<0.2	0.47	<0.05	BDL	BDL	BDL
18.	01.12.2020	20210101028	<0.05	<5	<1.0	0.78	<0.2	0.60	<0.05	BDL	BDL	BDL
19.	04.12.2020	20210101036	<0.05	<5	<1.0	0.90	<0.2	0.60	<0.05	BDL	BDL	BDL
20.	08.12.2020	20210101036	<0.05	<5	<1.0	1.12	<0.2	0.59	<0.05	BDL	BDL	BDL
21.	11.12.2020	20210101052	<0.05	<5	<1.0	0.81	<0.2	0.42	<0.05	BDL	BDL	BDL
22.	15.12.2020	20210101060	<0.05	<5	<1.0	0.95	<0.2	0.35	<0.05	BDL	BDL	BDL
23.	18.12.2020	20210101068	<0.05	<5	<1.0	0.75	<0.2	0.50	<0.05	BDL	BDL	BDL
24.	22.12.2020	20210101076	<0.05	<5	<1.0	0.60	<0.2	0.57	<0.05	BDL	BDL	BDL
25.	25.12.2020	20210101084	<0.05	<5	<1.0	0.84	<0.2	0.45	<0.05	BDL	BDL	BDL
26.	29.12.2020	20210101092	<0.05	<5	<1.0	0.83	<0.2	0.44	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	0.82	<0.2	0.46	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	0.81	<0.2	0.45	<0.05	BDL	BDL	BDL
STD. GEO. Devn. (24 Hrs)	<0.05	<5	<1.0	0.16	<0.2	0.09	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	1.15	<0.2	0.61	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	0.58	<0.2	0.31	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	1.14	<0.2	0.61	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1.0	20	06	05	1.0	--	0.36	--	--	--

Tested By
(Leena Sharma)
Asst. Chemist

Authorized Signatory
(Dr. S.K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. [illegible] dated 25.01.2021 upto 24.01.2024
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com/om.sharma@wolkem.com
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MoEFCC
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Wolkem INDIA LIMITED

Laboratory : E- 102, Mewar Industrial Area, Madri, Udaipur - 313003, Rajasthan (INDIA)

Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com

Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Gothra Village (A5)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2 (µg/m3)	NO_2 (µg/m3)	CO (mg/m³)	Ozone µg/M3	NH3 (µg/M3)
1.	02.10.2020	20201030175	250.38	108.03	9.4	36.1	0.69	44.69	45.67
2.	06.10.2020	20201030183	251.21	107.41	13.4	28.5	0.57	30.65	47.36
3.	09.10.2020	20201030191	259.29	116.10	16.9	32.4	0.8	26.35	51.87
4.	13.10.2020	20201030199	242.50	103.95	10.2	27.9	0.98	23.63	56.38
5.	16.10.2020	20201030207	246.45	97.99	11.4	37.4	0.87	26.07	62.02
6.	20.10.2020	20201030215	229.96	116.55	9.3	27.7	1.1	30.65	55.26
7.	23.10.2020	20201030223	266.15	116.22	12.0	40.7	0.68	32.23	49.05
8.	27.10.2020	20201030231	247.09	95.51	10.2	46.0	1.14	31.80	47.93
9.	30.10.2020	20201127039	262.79	113.30	11.4	32.6	0.84	32.23	56.95
10.	03.11.2020	20201127047	253.09	110.72	11.4	28.7	0.65	30.65	59.20
11.	06.11.2020	20201127055	254.90	104.06	11.0	35.7	0.95	30.22	55.82
12.	10.11.2020	20201127063	248.60	109.20	10.7	28.0	0.84	52.85	51.87
13.	13.11.2020	20201127071	260.01	116.93	10.6	44.3	1.12	28.36	46.80
14.	17.11.2020	20201127079	240.07	106.01	10.4	29.2	0.74	34.52	47.36
15.	20.11.2020	20201127087	261.38	118.15	10.5	42.7	1.1	26.78	49.62
16.	24.11.2020	20201127095	235.15	96.67	12.9	30.1	0.84	17.76	50.18
17.	27.11.2020	20210101021	242.24	105.15	14.2	36.4	0.92	37.81	51.87
18.	01.12.2020	20210101029	264.83	115.36	19.1	35.7	0.94	33.66	52.44
19.	04.12.2020	20210101037	258.53	112.79	11.3	41.5	0.84	45.40	53.00
20.	08.12.2020	20210101045	253.37	116.16	11.7	29.5	0.62	41.11	55.82
21.	11.12.2020	20210101053	251.12	110.88	10.2	38.5	0.92	19.19	49.05
22.	15.12.2020	20210101061	254.27	109.69	10.8	34.2	1.1	17.33	43.98
23.	18.12.2020	20210101069	246.24	111.38	8.4	30.0	1.01	16.76	40.03
24.	22.12.2020	20210101077	252.60	108.92	10.5	34.3	0.84	22.20	49.62
25.	25.12.2020	20210101085	255.34	103.97	11.3	37.3	0.74	34.09	46.23
26.	29.12.2020	20210101093	253.05	106.99	11.1	26.8	0.81	28.50	50.75

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m³)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	251.56	109.16	11.55	34.32	0.87	30.60	51.01
Geometric Mean	251.41	108.98	11.37	33.89	0.86	29.37	50.77
STD.GEO.Devn. (24 Hrs)	8.84	6.34	2.28	5.61	0.16	8.86	4.95
Max. Concentration	266.15	118.15	19.12	46.02	1.14	52.85	62.02
Min. Concentration	229.96	95.51	8.44	26.80	0.57	16.76	40.03
98% PERCENTILE VALUES	265.49	117.54	18.00	45.14	1.13	49.13	60.61
CPCB norms (µg/m3)	100	60	80	80	4	100	400

Note

1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com/m.shukla@wolkem.com
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Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Gothra Village (A5)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	02.10.2020	20201030175	<0.05	<5	<1.0	0.54	<0.2	0.41	<0.05	BDL	BDL	BDL
2.	06.10.2020	20201030183	<0.05	<5	<1.0	0.84	<0.2	0.47	<0.05	BDL	BDL	BDL
3.	09.10.2020	20201030191	<0.05	<5	<1.0	0.10	<0.2	0.51	<0.05	BDL	BDL	BDL
4.	13.10.2020	20201030199	<0.05	<5	<1.0	0.94	<0.2	0.54	<0.05	BDL	BDL	BDL
5.	16.10.2020	20201030207	<0.05	<5	<1.0	0.65	<0.2	0.42	<0.05	BDL	BDL	BDL
6.	20.10.2020	20201030215	<0.05	<5	<1.0	0.62	<0.2	0.49	<0.05	BDL	BDL	BDL
7.	23.10.2020	20201030223	<0.05	<5	<1.0	0.71	<0.2	0.50	<0.05	BDL	BDL	BDL
8.	27.10.2020	20201030231	<0.05	<5	<1.0	0.75	<0.2	0.57	<0.05	BDL	BDL	BDL
9.	30.10.2020	20201127039	<0.05	<5	<1.0	1.21	<0.2	0.51	<0.05	BDL	BDL	BDL
10.	03.11.2020	20201127047	<0.05	<5	<1.0	0.95	<0.2	0.47	<0.05	BDL	BDL	BDL
11.	06.11.2020	20201127055	<0.05	<5	<1.0	0.92	<0.2	0.48	<0.05	BDL	BDL	BDL
12.	10.11.2020	20201127063	<0.05	<5	<1.0	0.84	<0.2	0.62	<0.05	BDL	BDL	BDL
13.	13.11.2020	20201127071	<0.05	<5	<1.0	0.58	<0.2	0.60	<0.05	BDL	BDL	BDL
14.	17.11.2020	20201127079	<0.05	<5	<1.0	0.54	<0.2	0.55	<0.05	BDL	BDL	BDL
15.	20.11.2020	20201127087	<0.05	<5	<1.0	0.74	<0.2	0.57	<0.05	BDL	BDL	BDL
16.	24.11.2020	20201127095	<0.05	<5	<1.0	0.73	<0.2	0.47	<0.05	BDL	BDL	BDL
17.	27.11.2020	20210101021	<0.05	<5	<1.0	0.84	<0.2	0.54	<0.05	BDL	BDL	BDL
18.	01.12.2020	20210101029	<0.05	<5	<1.0	0.82	<0.2	0.60	<0.05	BDL	BDL	BDL
19.	04.12.2020	20210101037	<0.05	<5	<1.0	0.64	<0.2	0.39	<0.05	BDL	BDL	BDL
20.	08.12.2020	20210101045	<0.05	<5	<1.0	0.68	<0.2	0.33	<0.05	BDL	BDL	BDL
21.	11.12.2020	20210101053	<0.05	<5	<1.0	0.74	<0.2	0.36	<0.05	BDL	BDL	BDL
22.	15.12.2020	20210101061	<0.05	<5	<1.0	0.84	<0.2	0.50	<0.05	BDL	BDL	BDL
23.	18.12.2020	20210101069	<0.05	<5	<1.0	0.69	<0.2	0.48	<0.05	BDL	BDL	BDL
24.	22.12.2020	20210101077	<0.05	<5	<1.0	0.78	<0.2	0.47	<0.05	BDL	BDL	BDL
25.	25.12.2020	20210101085	<0.05	<5	<1.0	0.85	<0.2	0.41	<0.05	BDL	BDL	BDL
26.	29.12.2020	20210101093	<0.05	<5	<1.0	0.97	<0.2	0.58	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	0.75	<0.2	0.49	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	0.71	<0.2	0.49	<0.05	BDL	BDL	BDL
STD. GEO. Devn. (24 Hrs)	<0.05	<5	<1.0	0.20	<0.2	0.08	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	1.21	<0.2	0.62	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	0.10	<0.2	0.33	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	1.09	<0.2	0.61	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1.0	20	06	05	1.0	--	0.36	--	--	--

Tested By
(Leena Sharma)
Asst. Chemist

Authorized Signatory
(Dr. S.K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. [illegible]
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Date: - 11.01.2021

TEST REPORT
(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Gosainwala Village (A6)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2(µg/m3)	NO_2 (µg/m3)	CO (mg/m³)	Ozone µg/M3	NH3 (µg/M3)
1.	02.10.2020	20201030176	262.41	118.46	11.3	35.3	1.12	26.50	47.36
2.	06.10.2020	20201030184	246.13	96.29	10.8	25.4	0.94	23.20	50.18
3.	09.10.2020	20201030192	255.66	104.48	10.1	33.0	1.04	21.20	42.29
4.	13.10.2020	20201030200	259.51	100.87	11.7	27.7	0.92	30.08	43.98
5.	16.10.2020	20201030208	238.51	104.77	11.5	36.6	0.94	32.94	16.92
6.	20.10.2020	20201030216	254.26	99.60	9.9	28.3	0.87	28.36	48.49
7.	23.10.2020	20201030224	240.24	92.67	13.2	40.4	0.71	33.80	51.87
8.	27.10.2020	20201030232	258.19	105.75	10.7	39.5	0.54	24.92	56.38
9.	30.10.2020	20201127040	265.90	118.40	12.3	30.7	0.84	17.33	56.95
10.	03.11.2020	20201127048	247.38	100.72	12.9	27.8	1.01	20.34	62.59
11.	06.11.2020	20201127056	256.16	105.41	10.9	32.8	0.84	30.08	68.22
12.	10.11.2020	20201127064	264.76	104.41	12.3	26.1	0.68	20.77	50.18
13.	13.11.2020	20201127072	236.93	96.85	11.8	40.4	1.16	22.34	48.49
14.	17.11.2020	20201127080	262.47	101.51	12.3	26.8	0.78	25.49	51.87
15.	20.11.2020	20201127088	257.07	101.67	15.6	42.1	0.62	23.49	52.44
16.	24.11.2020	20201127096	265.00	109.81	11.3	29.8	0.52	23.78	56.95
17.	27.11.2020	20210101022	249.03	106.78	12.9	35.9	0.84	24.92	47.36
18.	01.12.2020	20210101030	261.92	107.88	12.4	33.6	0.94	26.64	50.75
19.	04.12.2020	20210101038	241.36	105.88	11.2	37.6	0.77	27.21	51.31
20.	08.12.2020	20210101046	266.64	105.26	11.6	30.6	0.68	28.65	49.62
21.	11.12.2020	20210101054	278.30	110.31	11.0	40.7	0.57	28.79	44.54
22.	15.12.2020	20210101062	247.65	103.87	12.2	32.9	1.01	29.36	43.42
23.	18.12.2020	20210101070	258.47	109.26	10.6	31.1	0.95	28.50	46.23
24.	22.12.2020	20210101078	268.00	109.81	12.5	35.6	0.91	28.36	46.80
25.	25.12.2020	20210101086	243.84	100.21	11.9	38.2	0.71	26.78	51.42
26.	29.12.2020	20210101094	266.00	110.87	12.4	28.3	0.65	24.06	54.69

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m³)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	255.84	105.07	11.81	33.36	0.83	26.07	49.67
Geometric Mean	255.62	104.90	11.76	32.99	0.81	25.78	48.57
STD. GEO. Devn. (24 Hrs)	10.63	6.03	1.15	5.07	0.18	3.92	8.88
Max. Concentration	278.30	118.46	15.58	42.13	1.16	33.80	68.22
Min. Concentration	236.93	92.67	9.85	25.43	0.52	17.33	16.92
98% PERCENTILE VALUES	273.15	118.43	14.38	41.42	1.14	33.37	65.40
CPCB norms (µg/m3)	100	60	80	80	4	100	400

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
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Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com

Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Gosainwala Village (A6)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	02.10.2020	20201030176	<0.05	<5	<1.0	0.68	<0.2	0.34	<0.05	BDL	BDL	BDL
2.	06.10.2020	20201030184	<0.05	<5	<1.0	0.60	<0.2	0.36	<0.05	BDL	BDL	BDL
3.	09.10.2020	20201030192	<0.05	<5	<1.0	0.61	<0.2	0.34	<0.05	BDL	BDL	BDL
4.	13.10.2020	20201030200	<0.05	<5	<1.0	0.74	<0.2	0.47	<0.05	BDL	BDL	BDL
5.	16.10.2020	20201030208	<0.05	<5	<1.0	0.54	<0.2	0.58	<0.05	BDL	BDL	BDL
6.	20.10.2020	20201030216	<0.05	<5	<1.0	0.69	<0.2	0.60	<0.05	BDL	BDL	BDL
7.	23.10.2020	20201030224	<0.05	<5	<1.0	0.84	<0.2	0.42	<0.05	BDL	BDL	BDL
8.	27.10.2020	20201030232	<0.05	<5	<1.0	0.98	<0.2	0.40	<0.05	BDL	BDL	BDL
9.	30.10.2020	20201127040	<0.05	<5	<1.0	1.14	<0.2	0.38	<0.05	BDL	BDL	BDL
10.	03.11.2020	20201127048	<0.05	<5	<1.0	0.91	<0.2	0.36	<0.05	BDL	BDL	BDL
11.	06.11.2020	20201127056	<0.05	<5	<1.0	0.74	<0.2	0.32	<0.05	BDL	BDL	BDL
12.	10.11.2020	20201127064	<0.05	<5	<1.0	0.71	<0.2	0.34	<0.05	BDL	BDL	BDL
13.	13.11.2020	20201127072	<0.05	<5	<1.0	1.16	<0.2	0.32	<0.05	BDL	BDL	BDL
14.	17.11.2020	20201127080	<0.05	<5	<1.0	0.69	<0.2	0.34	<0.05	BDL	BDL	BDL
15.	20.11.2020	20201127088	<0.05	<5	<1.0	0.85	<0.2	0.61	<0.05	BDL	BDL	BDL
16.	24.11.2020	20201127096	<0.05	<5	<1.0	0.82	<0.2	0.54	<0.05	BDL	BDL	BDL
17.	27.11.2020	20210101022	<0.05	<5	<1.0	0.94	<0.2	0.51	<0.05	BDL	BDL	BDL
18.	01.12.2020	20210101030	<0.05	<5	<1.0	0.74	<0.2	0.36	<0.05	BDL	BDL	BDL
19.	04.12.2020	20210101038	<0.05	<5	<1.0	0.75	<0.2	0.34	<0.05	BDL	BDL	BDL
20.	08.12.2020	20210101046	<0.05	<5	<1.0	0.62	<0.2	0.32	<0.05	BDL	BDL	BDL
21.	11.12.2020	20210101054	<0.05	<5	<1.0	0.65	<0.2	0.40	<0.05	BDL	BDL	BDL
22.	15.12.2020	20210101062	<0.05	<5	<1.0	0.74	<0.2	0.46	<0.05	BDL	BDL	BDL
23.	18.12.2020	20210101070	<0.05	<5	<1.0	0.62	<0.2	0.42	<0.05	BDL	BDL	BDL
24.	22.12.2020	20210101078	<0.05	<5	<1.0	0.57	<0.2	0.60	<0.05	BDL	BDL	BDL
25.	25.12.2020	20210101086	<0.05	<5	<1.0	0.74	<0.2	0.47	<0.05	BDL	BDL	BDL
26.	29.12.2020	20210101094	<0.05	<5	<1.0	0.71	<0.2	0.40	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	0.76	<0.2	0.42	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	0.75	<0.2	0.41	<0.05	BDL	BDL	BDL
STD. GEO. Devn. (24 Hrs)	<0.05	<5	<1.0	0.16	<0.2	0.10	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	1.16	<0.2	0.61	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	0.54	<0.2	0.32	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	1.15	<0.2	0.61	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1.0	20	06	05	1.0	--	0.36	--	--	--

Tested By
(Leena Sharma)
Asst. Chemist

Authorized Signatory
(Dr. S.K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

ENVIRONMENTAL & CHEMICAL LABORATORY RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. ... is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com
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MoEFCC OHSAS Certificate No. 52024-A111

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Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com
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Date: - 11.01.2021

TEST REPORT
(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Pakhal Village (A7)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2(µg/m3)	NO_2 (µg/m3)	CO (mg/m³)	Ozone µg/M3	NH3 (µg/M3)
1.	03.10.2020	20201030177	246.72	103.21	12.6	29.6	0.71	12.03	33.83
2.	07.10.2020	20201030185	234.45	98.63	11.3	35.5	0.74	15.04	34.39
3.	10.10.2020	20201030193	266.19	117.89	12.0	23.3	0.68	11.74	30.45
4.	14.10.2020	20201030201	234.00	82.45	9.8	25.2	0.81	9.31	29.32
5.	17.10.2020	20201030209	260.73	112.36	10.7	26.4	0.84	12.03	27.63
6.	21.10.2020	20201030217	238.39	101.88	11.6	30.5	0.93	10.74	36.65
7.	24.10.2020	20201030225	267.27	122.26	10.3	29.4	0.99	13.89	35.52
8.	28.10.2020	20201030233	240.40	95.71	10.0	23.8	1.01	20.77	32.70
9.	31.10.2020	20201127041	246.27	78.53	12.7	26.6	0.84	9.17	27.63
10.	04.11.2020	20201127049	240.60	70.88	10.9	34.1	0.72	10.74	24.81
11.	07.11.2020	20201127057	264.95	74.48	11.8	21.8	0.91	11.74	36.09
12.	11.11.2020	20201127065	246.10	75.55	10.5	24.5	0.92	11.89	32.70
13.	14.11.2020	20201127073	265.89	77.18	11.7	24.8	0.84	12.60	31.01
14.	18.11.2020	20201127081	236.20	74.62	10.6	27.6	1.07	13.61	27.06
15.	21.11.2020	20201127089	271.01	76.53	12.5	28.6	1.11	9.88	24.81
16.	25.11.2020	20201127097	248.93	78.96	11.2	29.2	0.87	9.74	35.01
17.	28.11.2020	20210101023	230.79	81.72	9.1	22.8	1.13	10.17	34.84
18.	02.12.2020	20210101031	257.84	72.91	10.2	24.6	0.87	10.74	23.34
19.	05.12.2020	20210101039	238.77	73.48	11.8	34.4	0.92	11.60	24.13
20.	09.12.2020	20210101047	262.09	68.54	8.3	21.0	0.75	12.17	30.50
21.	12.12.2020	20210101055	239.45	70.00	11.2	24.1	0.74	13.46	32.70
22.	16.12.2020	20210101063	264.46	72.38	9.2	24.9	0.84	17.62	30.45
23.	19.12.2020	20210101071	242.55	73.37	11.4	30.5	0.58	17.76	34.39
24.	23.12.2020	20210101079	253.95	76.42	11.6	28.2	0.47	14.18	33.83
25.	26.12.2020	20210101087	242.13	77.55	9.3	22.4	0.58	17.90	28.19
26.	30.12.2020	20210101095	267.58	76.10	9.7	25.3	0.92	18.48	27.06

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m³)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	250.30	83.98	10.85	26.89	0.84	13.04	30.73
Geometric Mean	249.98	82.75	10.78	26.62	0.82	12.71	30.47
STD.GEO.Devn. (24 Hrs)	12.81	15.65	1.17	3.92	0.16	3.14	4.01
Max. Concentration	271.01	122.26	12.74	35.48	1.13	20.77	36.65
Min. Concentration	230.79	68.54	8.25	21.02	0.47	9.17	23.34
98% PERCENTILE VALUES	269.30	120.07	12.69	34.95	1.12	19.62	36.37
CPCB norms (µg/m3)	100		80	80	4	100	400

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act/1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com/om.shukla@wolkem.com
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MoEFCC
OHSAS Certificate No. 32024-A111

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Laboratory : E- 102, Mewar Industrial Area, Madri, Udaipur - 313003, Rajasthan (INDIA)
Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com

Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Pakhal Village (A7)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m³)	CH4 (mg/m³)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	03.10.2020	20201030177	<0.05	<5	<1.0	0.57	<0.2	0.34	<0.05	BDL	BDL	BDL
2.	07.10.2020	20201030185	<0.05	<5	<1.0	0.54	<0.2	0.51	<0.05	BDL	BDL	BDL
3.	10.10.2020	20201030193	<0.05	<5	<1.0	0.84	<0.2	0.36	<0.05	BDL	BDL	BDL
4.	14.10.2020	20201030201	<0.05	<5	<1.0	0.82	<0.2	0.52	<0.05	BDL	BDL	BDL
5.	17.10.2020	20201030209	<0.05	<5	<1.0	0.71	<0.2	0.51	<0.05	BDL	BDL	BDL
6.	21.10.2020	20201030217	<0.05	<5	<1.0	0.65	<0.2	0.32	<0.05	BDL	BDL	BDL
7.	24.10.2020	20201030225	<0.05	<5	<1.0	0.68	<0.2	0.48	<0.05	BDL	BDL	BDL
8.	28.10.2020	20201030233	<0.05	<5	<1.0	0.84	<0.2	0.42	<0.05	BDL	BDL	BDL
9.	31.10.2020	20201127041	<0.05	<5	<1.0	0.81	<0.2	0.47	<0.05	BDL	BDL	BDL
10.	04.11.2020	20201127049	<0.05	<5	<1.0	0.69	<0.2	0.42	<0.05	BDL	BDL	BDL
11.	07.11.2020	20201127057	<0.05	<5	<1.0	0.84	<0.2	0.38	<0.05	BDL	BDL	BDL
12.	11.11.2020	20201127065	<0.05	<5	<1.0	0.54	<0.2	0.36	<0.05	BDL	BDL	BDL
13.	14.11.2020	20201127073	<0.05	<5	<1.0	0.74	<0.2	0.35	<0.05	BDL	BDL	BDL
14.	18.11.2020	20201127081	<0.05	<5	<1.0	0.62	<0.2	0.40	<0.05	BDL	BDL	BDL
15.	21.11.2020	20201127089	<0.05	<5	<1.0	0.52	<0.2	0.57	<0.05	BDL	BDL	BDL
16.	25.11.2020	20201127097	<0.05	<5	<1.0	0.58	<0.2	0.47	<0.05	BDL	BDL	BDL
17.	28.11.2020	20210101023	<0.05	<5	<1.0	0.67	<0.2	0.52	<0.05	BDL	BDL	BDL
18.	02.12.2020	20210101031	<0.05	<5	<1.0	0.82	<0.2	0.47	<0.05	BDL	BDL	BDL
19.	05.12.2020	20210101039	<0.05	<5	<1.0	0.80	<0.2	0.32	<0.05	BDL	BDL	BDL
20.	09.12.2020	20210101047	<0.05	<5	<1.0	0.61	<0.2	0.59	<0.05	BDL	BDL	BDL
21.	12.12.2020	20210101055	<0.05	<5	<1.0	0.74	<0.2	0.31	<0.05	BDL	BDL	BDL
22.	16.12.2020	20210101063	<0.05	<5	<1.0	0.72	<0.2	0.52	<0.05	BDL	BDL	BDL
23.	19.12.2020	20210101071	<0.05	<5	<1.0	0.65	<0.2	0.35	<0.05	BDL	BDL	BDL
24.	23.12.2020	20210101079	<0.05	<5	<1.0	0.71	<0.2	0.38	<0.05	BDL	BDL	BDL
25.	26.12.2020	20210101087	<0.05	<5	<1.0	0.64	<0.2	0.47	<0.05	BDL	BDL	BDL
26.	30.12.2020	20210101095	<0.05	<5	<1.0	0.68	<0.2	0.42	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	0.69	<0.2	0.43	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	0.69	<0.2	0.42	<0.05	BDL	BDL	BDL
STD. GEO. Devn. (24 Hrs)	<0.05	<5	<1.0	0.10	<0.2	0.08	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	0.84	<0.2	0.59	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	0.52	<0.2	0.31	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	0.84	<0.2	0.58	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1.0	20	06	05	1.0	--	0.36	--	--	--

Tested By

(Leena Sharma)
Asst. Chemist

ENVIRONMENTAL & CHEMICAL LABORATORY RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA

Authorized Signatory

(Dr. S.K. Yadav)
Chief Manager (Environment)
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Note
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Page 2 of 2
End of Report

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Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com
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Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Palika Bas (A8)

S. No.	Date of Monitoring	Registration No.	PM10 (µg/m3)	PM2.5 (µg/m3)	SO_2(µg/m3)	NO_2 (µg/m3)	CO (mg/m³)	Ozone µg/M3	NH3 (µg/M3)
1.	03.10.2020	20201030178	234.38	100.48	12.3	25.6	0.84	6.02	22.55
2.	07.10.2020	20201030186	216.42	80.28	8.7	20.9	0.82	3.87	23.12
3.	10.10.2020	20201030194	226.76	94.41	12.0	25.0	0.91	5.01	16.92
4.	14.10.2020	20201030202	212.81	84.78	12.2	27.1	1.14	6.87	19.73
5.	17.10.2020	20201030210	230.53	95.97	9.4	20.9	1.04	3.87	16.35
6.	21.10.2020	20201030218	209.73	84.57	11.1	24.4	0.84	5.01	11.84
7.	24.10.2020	20201030226	245.52	100.97	9.2	18.9	0.97	8.88	12.40
8.	28.10.2020	20201030234	219.50	88.63	12.8	17.8	0.84	4.58	19.17
9.	31.10.2020	20201127042	242.59	106.88	12.6	27.5	0.65	4.01	26.50
10.	04.11.2020	20201127050	212.23	86.49	12.7	26.4	0.71	3.44	18.04
11.	07.11.2020	20201127058	241.18	101.06	10.5	24.8	0.85	5.16	13.53
12.	11.11.2020	20201127066	215.59	88.38	9.9	19.0	0.9	6.02	10.71
13.	14.11.2020	20201127074	243.29	103.74	10.7	22.0	0.93	8.59	11.84
14.	18.11.2020	20201127082	221.57	91.19	12.3	26.7	1.01	8.74	11.28
15.	21.11.2020	20201127090	239.23	102.74	11.6	21.8	0.82	8.31	13.53
16.	25.11.2020	20201127098	222.22	93.92	10.9	21.8	0.75	7.45	14.66
17.	28.11.2020	20210101024	213.55	80.74	12.0	18.8	0.47	6.02	16.35
18.	02.12.2020	20210101032	216.59	83.15	12.4	16.9	0.68	7.02	18.04
19.	05.12.2020	20210101040	207.23	82.41	10.5	18.9	0.94	5.16	18.61
20.	09.12.2020	20210101048	244.48	100.14	9.0	21.0	1.08	4.87	19.17
21.	12.12.2020	20210101056	214.12	88.74	9.3	19.2	1.02	5.44	15.79
22.	16.12.2020	20210101064	211.67	85.98	12.0	16.3	0.74	4.01	13.53
23.	19.12.2020	20210101072	242.09	91.58	9.5	24.3	0.68	3.44	15.22
24.	23.12.2020	20210101080	214.69	82.41	9.8	22.0	0.51	3.72	17.48
25.	26.12.2020	20210101088	240.98	93.92	11.6	22.3	0.58	4.44	16.86
26.	30.12.2020	20210101096	215.33	87.73	12.9	17.5	0.74	3.15	10.66

Number of observations	PM 10 (µg/M3)	PM 2.5 (µg/M3)	SO2 (µg/M3)	NO2 (µg/M3)	CO (mg/m³)	Ozone (µg/M3)	NH3 (µg/M3)
Arithmetic Mean	225.17	91.59	11.07	21.84	0.83	5.50	16.30
Geometric Mean	224.80	91.27	10.99	21.59	0.81	5.25	15.85
STD.GEO.Devn. (24 Hrs)	13.19	7.88	1.35	3.36	0.17	1.77	4.01
Max. Concentration	245.52	106.88	12.86	27.50	1.14	8.88	26.50
Min. Concentration	207.23	80.28	8.72	16.34	0.47	3.15	10.66
98% PERCENTILE VALUES	245.00	105.31	12.84	27.29	1.11	8.81	24.81
CPCB norms (µg/m3)	100	60	80	80	4	100	400

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com/com.samples@wolkem.com
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Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com

Date: - 11.01.2021

TEST REPORT

(Ambient Air Quality)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Location : Palika Bas (A8)

S. No.	Date of Monitoring	Registration No.	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
1.	03.10.2020	20201030178	<0.05	<5	<1.0	0.48	<0.2	0.36	<0.05	BDL	BDL	BDL
2.	07.10.2020	20201030186	<0.05	<5	<1.0	0.45	<0.2	0.38	<0.05	BDL	BDL	BDL
3.	10.10.2020	20201030194	<0.05	<5	<1.0	0.67	<0.2	0.50	<0.05	BDL	BDL	BDL
4.	14.10.2020	20201030202	<0.05	<5	<1.0	0.61	<0.2	0.44	<0.05	BDL	BDL	BDL
5.	17.10.2020	20201030210	<0.05	<5	<1.0	0.78	<0.2	0.52	<0.05	BDL	BDL	BDL
6.	21.10.2020	20201030218	<0.05	<5	<1.0	0.81	<0.2	0.40	<0.05	BDL	BDL	BDL
7.	24.10.2020	20201030226	<0.05	<5	<1.0	0.69	<0.2	0.54	<0.05	BDL	BDL	BDL
8.	28.10.2020	20201030234	<0.05	<5	<1.0	0.65	<0.2	0.44	<0.05	BDL	BDL	BDL
9.	31.10.2020	20201127042	<0.05	<5	<1.0	0.78	<0.2	0.30	<0.05	BDL	BDL	BDL
10.	04.11.2020	20201127050	<0.05	<5	<1.0	0.80	<0.2	0.44	<0.05	BDL	BDL	BDL
11.	07.11.2020	20201127058	<0.05	<5	<1.0	0.90	<0.2	0.50	<0.05	BDL	BDL	BDL
12.	11.11.2020	20201127066	<0.05	<5	<1.0	0.48	<0.2	0.38	<0.05	BDL	BDL	BDL
13.	14.11.2020	20201127074	<0.05	<5	<1.0	0.54	<0.2	0.36	<0.05	BDL	BDL	BDL
14.	18.11.2020	20201127082	<0.05	<5	<1.0	0.68	<0.2	0.41	<0.05	BDL	BDL	BDL
15.	21.11.2020	20201127090	<0.05	<5	<1.0	0.74	<0.2	0.30	<0.05	BDL	BDL	BDL
16.	25.11.2020	20201127098	<0.05	<5	<1.0	0.58	<0.2	0.30	<0.05	BDL	BDL	BDL
17.	28.11.2020	20210101024	<0.05	<5	<1.0	0.84	<0.2	0.32	<0.05	BDL	BDL	BDL
18.	02.12.2020	20210101032	<0.05	<5	<1.0	0.81	<0.2	0.48	<0.05	BDL	BDL	BDL
19.	05.12.2020	20210101040	<0.05	<5	<1.0	0.61	<0.2	0.38	<0.05	BDL	BDL	BDL
20.	09.12.2020	20210101048	<0.05	<5	<1.0	0.47	<0.2	0.38	<0.05	BDL	BDL	BDL
21.	12.12.2020	20210101056	<0.05	<5	<1.0	0.42	<0.2	0.48	<0.05	BDL	BDL	BDL
22.	16.12.2020	20210101064	<0.05	<5	<1.0	0.71	<0.2	0.46	<0.05	BDL	BDL	BDL
23.	19.12.2020	20210101072	<0.05	<5	<1.0	0.58	<0.2	0.60	<0.05	BDL	BDL	BDL
24.	23.12.2020	20210101080	<0.05	<5	<1.0	0.51	<0.2	0.32	<0.05	BDL	BDL	BDL
25.	26.12.2020	20210101088	<0.05	<5	<1.0	0.67	<0.2	0.40	<0.05	BDL	BDL	BDL
26.	30.12.2020	20210101096	<0.05	<5	<1.0	0.47	<0.2	0.58	<0.05	BDL	BDL	BDL

Number of observations	Lead (Pb) (µg/m3)	Nickel (Ni) (ng/m3)	Arsenic (As) (ng/m3)	Benzene (µg/m3)	B(a)P (ng/m3)	CH4 (mg/m3)	H2S (ppm)	Hg (ng/m3)	VOCs (µg/m3)	NMHC (ng/m3)
Arithmetic Mean	<0.05	<5	<1.0	0.64	<0.2	0.42	<0.05	BDL	BDL	BDL
Geometric Mean	<0.05	<5	<1.0	0.63	<0.2	0.41	<0.05	BDL	BDL	BDL
STD. GED. Devn. (24 Hrs)	<0.05	<5	<1.0	0.14	<0.2	0.09	<0.05	BDL	BDL	BDL
Max. Concentration	<0.05	<5	<1.0	0.90	<0.2	0.60	<0.05	BDL	BDL	BDL
Min. Concentration	<0.05	<5	<1.0	0.42	<0.2	0.30	<0.05	BDL	BDL	BDL
98% PERCENTILE VALUES	<0.05	<5	<1.0	0.87	<0.2	0.59	<0.05	BDL	BDL	BDL
CPCB norms (µg/m3)	1.0	20	06	05	1.0	--	0.36	--	--	--

Tested By
(Leena Sharma)
Asst. Chemist

Authorized Signatory
(Dr. S.K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited,
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
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Noise Level Monitoring Results

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Date: 26.10.2020

TEST REPORT
(Noise Analysis)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date of Monitoring** : 01.10.2020
4. **Test Methods Reference** : IS: 9989– 1981 (Reaffirmed 2014)
5. **Name of location** : Project Side (N1)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	50.9	52.6	48.4	52.7
2.	7-8 AM	48.6	52.2	45.1	52.4
3.	8-9 AM	50.1	53.0	46.9	53.2
4.	9-10 AM	49.6	51.8	46.8	52.0
5.	10-11 AM	62.3	64.4	59.1	64.5
6.	11-12 AM	59.4	63.9	55.0	64.2
7.	12-13PM	61.3	64.9	57.2	65.2
8.	13-14 PM	60.7	63.4	57.1	63.6
9.	14-15 PM	58.3	64.1	55.2	64.2
10.	15-16 PM	61.3	64.4	56.9	64.7
11.	16-17 PM	55.3	57.1	52.4	57.3
12.	17-18 PM	53.7	57.7	49.7	57.9
13.	18-19 PM	46.1	47.6	43.9	47.7
14.	19-20 PM	42.1	45.2	38.9	45.4
15.	20-21PM	43.4	46.0	40.5	46.1
16.	21-22PM	45.0	46.9	42.4	47.1
Leq Day (Leq = L50 + [(L10 – L90)²/60)])					56.1

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www.wolkem.com

Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 01.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Project Side (N1)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	39.1	40.3	37.1	40.4
2.	23-24PM	37.3	40.0	34.7	40.1
3.	0-1 AM	38.4	40.6	36.0	40.7
4.	1-2 AM	38.1	39.7	35.9	39.8
5.	2-3 AM	38.5	41.3	35.7	41.4
6.	3-4 AM	39.7	41.9	37.2	42.1
7.	4-5 AM	39.3	41.0	37.1	41.1
8.	5-6 AM	38.5	39.1	38.0	39.1
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					40.6
Day-Night Sound Level (Ldn) = 10 log {1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]}					
Ldn					55.3

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By

(Leena Sharma)
Asst. Chemist

RECOGNIZED BY MOEF. CC GOVERNMENT OF INDIA ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory

Dr. S.K. Yadav
Chief Manager (Environmental)
Environmental & Chemical Laboratory
Wolkem India Limited
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End of Report

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Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 04.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Bandhwari village (N2)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	41.5	42.1	40.8	42.1
2.	7-8 AM	41.9	42.5	41.4	42.5
3.	8-9 AM	49.1	50.4	47.0	50.5
4.	9-10 AM	50.9	51.7	49.6	51.7
5.	10-11 AM	55.5	57.2	52.9	57.4
6.	11-12 AM	60.2	64.5	55.9	64.8
7.	12-13PM	62.0	65.5	58.1	65.8
8.	13-14 PM	61.4	64.1	58.0	64.3
9.	14-15 PM	53.9	58.7	51.3	58.8
10.	15-16 PM	56.4	59.0	52.7	59.2
11.	16-17 PM	56.9	60.5	52.3	60.9
12.	17-18 PM	53.2	53.9	52.5	53.9
13.	18-19 PM	53.3	54.6	51.1	54.7
14.	19-20 PM	55.2	55.9	53.8	56.0
15.	20-21PM	50.4	51.1	49.2	51.1
16.	21-22PM	45.8	47.2	43.7	47.2
Leq Day (Leq = L50 + [(L10 – L90)^2/60)])					55.0

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Date: 26.10.2020

TEST REPORT
(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 04.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Bandhwari village (N2)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	38.2	38.8	37.7	38.8
2.	23-24PM	36.1	37.1	35.4	37.1
3.	0-1 AM	35.6	36.2	35.1	36.2
4.	1-2 AM	35.5	36.5	34.8	36.5
5.	2-3 AM	34.1	34.7	33.7	34.7
6.	3-4 AM	36.0	37.0	35.3	37.0
7.	4-5 AM	37.3	37.9	36.8	37.9
8.	5-6 AM	36.1	37.1	35.4	37.1
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					36.9
Day-Night Sound Level (Ldn) = 10 log {1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]}					
Ldn					53.6

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By
(Leena Sharma)
Asst. Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environmental)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
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Date: 26.10.2020

TEST REPORT
(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 08.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Mandi village (N3)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	49.2	49.9	48.4	49.9
2.	7-8 AM	49.7	50.4	49.1	50.4
3.	8-9 AM	51.8	53.1	49.6	53.2
4.	9-10 AM	52.6	53.4	51.3	53.4
5.	10-11 AM	54.1	55.9	51.4	56.0
6.	11-12 AM	56.3	60.4	52.2	60.7
7.	12-13PM	58.0	61.4	54.3	61.6
8.	13-14 PM	58.1	60.6	54.7	60.8
9.	14-15 PM	56.8	62.1	53.9	62.3
10.	15-16 PM	59.5	62.5	55.5	62.7
11.	16-17 PM	60.1	64.1	55.1	64.5
12.	17-18 PM	55.1	58.4	51.9	58.5
13.	18-19 PM	52.0	55.9	48.7	56.1
14.	19-20 PM	44.9	45.5	44.1	45.6
15.	20-21PM	45.4	46.0	44.8	46.0
16.	21-22PM	47.3	48.6	45.3	48.6
Leq Day (Leq = L50 + [(L10 – L90)^2/60)])					55.7

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www.wolkem.com

Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 08.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Mandi village (N3)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	37.5	38.5	36.8	38.6
2.	23-24PM	37.0	37.6	36.5	37.6
3.	0-1 AM	38.2	39.3	37.4	39.3
4.	1-2 AM	37.7	38.3	37.2	38.3
5.	2-3 AM	36.2	37.2	35.5	37.3
6.	3-4 AM	35.7	36.3	35.3	36.3
7.	4-5 AM	40.3	41.4	39.5	41.4
8.	5-6 AM	39.7	40.4	39.2	40.4
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					38.6
Day-Night Sound Level (Ldn) = 10 log [1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]]					
Ldn					54.3

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By

(Leena Sharma)
Asst. Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL CHEMICAL LABORATORY

Authorized Signatory

Dr. S.K. Yadav
Chief Manager (Environmental)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note

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www.wolkem.com

Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 02.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Dhankuwal Village (N4)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	46.3	47.1	45.3	47.1
2.	7-8 AM	47.2	48.0	46.3	48.0
3.	8-9 AM	48.7	49.9	47.9	50.0
4.	9-10 AM	54.3	55.3	53.3	55.3
5.	10-11 AM	51.8	52.9	50.5	52.9
6.	11-12 AM	54.8	55.8	53.9	55.8
7.	12-13PM	54.2	55.0	53.1	55.0
8.	13-14 PM	53.9	54.6	53.1	54.6
9.	14-15 PM	55.1	55.7	54.4	55.7
10.	15-16 PM	56.6	57.5	55.9	57.5
11.	16-17 PM	57.6	58.6	56.9	58.6
12.	17-18 PM	55.2	56.0	54.4	56.0
13.	18-19 PM	52.7	53.9	50.8	54.0
14.	19-20 PM	48.7	49.6	47.9	49.6
15.	20-21PM	46.1	47.0	45.3	47.0
16.	21-22PM	44.0	45.3	43.1	45.4
Leq Day ($Leq = L50 + [(L10 - L90)^2/60)]$)					52.7

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Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date of Monitoring** : 02.10.2020
4. **Test Methods Reference** : IS: 9989– 1981 (Reaffirmed 2014)
5. **Name of location** : Dhankuwal Village (N4)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	36.1	36.7	35.3	36.7
2.	23-24PM	36.8	37.5	36.0	37.5
3.	0-1 AM	39.1	40.0	38.4	40.0
4.	1-2 AM	38.2	38.9	37.5	38.9
5.	2-3 AM	35.1	35.8	34.4	35.8
6.	3-4 AM	33.4	34.5	32.6	34.5
7.	4-5 AM	35.3	36.1	34.5	36.1
8.	5-6 AM	34.7	36.1	33.1	36.1
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					37.0
Day-Night Sound Level (Ldn) = 10 log {1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]}					
Ldn					51.4

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By

(Leena Sharma)
Asst. Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory

Dr. S.K. Yadav
Chief Manager (Environmental)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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www.wolkem.com

Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date of Monitoring** : 05.10.2020
4. **Test Methods Reference** : IS: 9989– 1981 (Reaffirmed 2014)
5. **Name of location** : Gothra Village (N5)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	43.6	44.5	42.9	44.5
2.	7-8 AM	41.2	42.0	40.3	42.0
3.	8-9 AM	39.1	40.4	38.3	40.4
4.	9-10 AM	41.6	42.5	40.9	42.5
5.	10-11 AM	39.3	40.1	38.5	40.1
6.	11-12 AM	55.5	56.4	54.4	56.4
7.	12-13PM	55.3	56.0	54.4	56.0
8.	13-14 PM	56.5	57.2	55.8	57.2
9.	14-15 PM	56.0	57.0	55.3	57.0
10.	15-16 PM	56.9	57.9	56.1	58.0
11.	16-17 PM	54.3	55.2	53.4	55.2
12.	17-18 PM	51.3	52.1	50.4	52.1
13.	18-19 PM	49.8	51.0	47.9	51.1
14.	19-20 PM	45.8	46.7	45.0	46.7
15.	20-21PM	43.2	44.0	42.3	44.1
16.	21-22PM	39.2	40.5	38.2	40.5
Leq Day (Leq = L50 + [(L10 – L90)^2/60)])					49.0

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Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 05.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Gothra Village (N5)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	33.8	34.6	32.5	35.1
2.	23-24PM	32.9	33.5	32.4	33.8
3.	0-1 AM	33.9	34.5	33.4	34.5
4.	1-2 AM	34.7	35.9	33.9	36.0
5.	2-3 AM	32.6	33.2	32.1	33.2
6.	3-4 AM	36.0	37.2	35.2	36.7
7.	4-5 AM	36.7	37.9	35.9	37.4
8.	5-6 AM	33.6	34.7	32.8	36.0
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					35.2
Day-Night Sound Level (Ldn) = 10 log {1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]}					
Ldn					48.0

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By

(Leena Sharma)
Asst. Chemist

Authorized Signatory

Dr. S.K. Yadav
Chief Manager (Environmental)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 09.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Gosainwal Village (N6)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	45.3	46.1	44.1	46.1
2.	7-8 AM	47.0	47.8	46.0	47.9
3.	8-9 AM	48.8	49.7	47.8	49.7
4.	9-10 AM	49.7	51.2	48.9	51.2
5.	10-11 AM	50.4	51.6	48.8	51.7
6.	11-12 AM	58.1	59.1	57.2	59.1
7.	12-13PM	55.2	56.7	54.1	56.7
8.	13-14 PM	56.9	58.2	55.4	58.3
9.	14-15 PM	60.6	62.1	58.6	62.2
10.	15-16 PM	59.6	60.5	57.6	60.5
11.	16-17 PM	55.6	56.3	54.9	56.3
12.	17-18 PM	53.7	54.5	52.4	54.5
13.	18-19 PM	52.8	53.5	52.1	53.5
14.	19-20 PM	50.2	51.1	48.9	51.1
15.	20-21PM	47.7	49.3	46.3	49.4
16.	21-22PM	46.6	48.5	44.6	48.5
Leq Day (Leq = L50 + [(L10 – L90)^2/60)])					53.5

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Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date of Monitoring** : 09.10.2020
4. **Test Methods Reference** : IS: 9989– 1981 (Reaffirmed 2014)
5. **Name of location** : Gosainwal Village (N6)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	36.5	37.1	36.0	37.1
2.	23-24PM	35.3	36.0	34.5	36.0
3.	0-1 AM	33.3	34.3	32.0	34.3
4.	1-2 AM	34.6	35.9	33.5	35.9
5.	2-3 AM	35.6	37.0	35.0	37.0
6.	3-4 AM	34.6	35.6	33.1	35.6
7.	4-5 AM	36.0	37.3	34.7	37.3
8.	5-6 AM	37.0	38.5	36.3	38.5
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					36.5
Day-Night Sound Level (Ldn) = 10 log {1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]}					
Ldn					52.5

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By

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Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 03.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Pakhal Village (N7)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	46.9	47.7	45.7	47.8
2.	7-8 AM	48.7	49.6	47.6	49.6
3.	8-9 AM	50.6	51.6	49.6	51.6
4.	9-10 AM	51.6	53.2	50.7	53.2
5.	10-11 AM	52.3	53.7	50.6	53.7
6.	11-12 AM	54.6	55.5	53.7	55.5
7.	12-13PM	51.8	53.2	50.8	53.2
8.	13-14 PM	53.4	54.7	52.0	54.7
9.	14-15 PM	55.6	57.1	53.8	57.1
10.	15-16 PM	54.7	55.5	52.8	55.6
11.	16-17 PM	53.0	53.7	52.4	53.7
12.	17-18 PM	51.2	52.0	50.0	52.0
13.	18-19 PM	51.0	51.6	50.4	51.6
14.	19-20 PM	49.6	50.5	48.3	50.5
15.	20-21PM	47.3	48.8	45.9	48.8
16.	21-22PM	44.8	46.6	42.9	46.6
Leq Day (Leq = L50 + [(L10 – L90)^2/60)])					52.2

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Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 03.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Pakhal Village (N7)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	41.2	42.3	40.2	42.3
2.	23-24PM	39.9	40.7	38.9	40.7
3.	0-1 AM	36.1	36.9	35.1	36.9
4.	1-2 AM	33.6	34.1	33.1	34.1
5.	2-3 AM	33.5	34.2	32.8	34.2
6.	3-4 AM	34.6	35.4	33.7	35.4
7.	4-5 AM	32.6	33.9	31.5	33.9
8.	5-6 AM	33.6	34.9	33.0	34.9
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					36.6
Day-Night Sound Level (Ldn) = 10 log {1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]}					
Ldn					51.0

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By

(Leena Sharma)
Asst. Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory

Dr. S.K. Yadav
Chief Manager (Environmental)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note

1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
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www.wolkem.com

Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 07.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Palika Bas (N8)

S.No.	Time hours	Sound Pressure Level dB(A) Day Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	6-7 AM	45.1	47.9	42.5	48.0
2.	7-8 AM	48.0	50.3	41.9	50.9
3.	8-9 AM	47.8	49.7	43.7	49.9
4.	9-10 AM	41.3	44.7	39.4	44.7
5.	10-11 AM	46.8	50.6	39.0	51.6
6.	11-12 AM	53.8	57.3	50.5	57.4
7.	12-13PM	59.6	62.6	52.0	63.5
8.	13-14 PM	61.9	64.3	56.8	64.7
9.	14-15 PM	52.8	57.1	50.4	57.2
10.	15-16 PM	59.8	64.5	49.9	66.2
11.	16-17 PM	59.8	62.1	53.4	62.8
12.	17-18 PM	44.5	47.2	42.0	47.3
13.	18-19 PM	47.2	49.5	41.4	50.1
14.	19-20 PM	49.0	50.8	45.0	51.1
15.	20-21PM	40.3	43.6	38.4	43.6
16.	21-22PM	45.6	49.3	38.0	50.3
Leq Day (Leq = L50 + [(L10 – L90)²/60)])					53.7

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www.wolkem.com

Date: 26.10.2020

TEST REPORT

(Noise Analysis)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date of Monitoring : 07.10.2020
4. Test Methods Reference : IS: 9989– 1981 (Reaffirmed 2014)
5. Name of location : Palika Bas (N8)

S.No.	Time hours	Sound Pressure Level dB(A) Night Time			Leq
		L_{10}	L_{50}	L_{90}	
1.	22-23PM	40.6	41.6	39.6	41.6
2.	23-24PM	39.3	40.1	38.4	40.1
3.	0-1 AM	34.8	35.6	33.9	35.6
4.	1-2 AM	35.0	35.5	34.4	35.5
5.	2-3 AM	36.3	37.1	35.4	37.1
6.	3-4 AM	37.9	38.9	36.4	38.9
7.	4-5 AM	36.3	37.6	35.0	37.6
8.	5-6 AM	36.6	38.0	35.9	38.0
Leq Night (Leq = L50 + [(L10 – L90)^2/60)])					38.1
Day-Night Sound Level (Ldn) = 10 log {1/24 [16 (10Lday/10) + 8 (10(Lnight + 10)/10)]}					
Ldn					52.5

CPCB Norms

S. No	Category of area	6 AM to 10 PM	10 PM to 6 AM
1	Industrial Area	75.0	70.0
2	Commercial Area	65.0	55.0
3	Residential Area	55.0	45.0

Tested By

(Leena Sharma)
Asst. Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA

Authorized Signatory

Dr. S.K. Yadav
Chief Manager (Environmental)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
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Soil Quality Monitoring Results

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Report No. 20201222063 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/09:30AM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Project site
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	6.89
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff.2016	µs/cm	458.6
3.	Color	Book Practical agricultural chemistry	-	Brownish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.10
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	45.95
6.	Bulk Density	IS:1462:1985, Reaff.2017	gm/cc	1.25
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	1.94
8.	Porosity	Book Practical agricultural chemistry	%	43.77
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	0.54
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	0.94
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	9.60
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	2.88
13.	Available Phosphorous	IS:10158-1982 Reaff 2014	Kg/ha	32.25
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	245.7
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	1.56
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	146.5
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	1.27
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	1.42
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.0063
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0028
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.0026
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By
(Hema Kapuria)
Asst.Officer (QC & QA)

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, Mewar Industrial Area, Madri, Udaipur (Rajasthan)

Note
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Report No. 20201222064 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/10:10AM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Bandhwari village
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	7.20
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff.2016	µs/cm	160.7
3.	Color	Book Practical agricultural chemistry	-	Brownish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.00
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	48.47
6.	Bulk Density	IS:1462:1985, Reaff.2017	gm/cc	1.27
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	4.83
8.	Porosity	Book Practical agricultural chemistry	%	41.53
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	0.38
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	0.65
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	8.00
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	1.92
13.	Available Phosphorous	IS:10158-1982 Reaff 2014	Kg/ha	53.42
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	321.3
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	1.68
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	138.28
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	1.08
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	1.33
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.0013
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0039
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.0022
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By
(Hema Kapuria)
Asst.Officer (QC & QA)

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
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Report No. 20201222065 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/11:40AM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Mandi village
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	7.35
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff.2016	µs/cm	132
3.	Color	Book Practical agricultural chemistry	-	Brownish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.20
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	48.72
6.	Bulk Density	IS:1462:1985, Reaff.2017	gm/cc	1.26
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	2.42
8.	Porosity	Book Practical agricultural chemistry	%	45.82
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	0.69
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	1.19
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	11.20
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	3.84
13.	Available Phosphorous	IS:10158-1982 Reaff 2014	Kg/ha	73.32
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	144.9
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	0.98
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	126.92
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	1.42
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	1.38
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.0006
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0042
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.003
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By
(Hema Kapuria)
Asst.Officer (QC & QA)

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
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Report No. 20201222066 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/12:25PM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Dhankuwal johar
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	7.29
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff.2016	µs/cm	332
3.	Color	Book Practical agricultural chemistry	-	Yellowish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.10
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	44.22
6.	Bulk Density	IS:1462:1985, Reaff.2017	gm/cc	1.22
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	3.58
8.	Porosity	Book Practical agricultural chemistry	%	49.34
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	0.14
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	0.25
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	6.40
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	1.92
13.	Available Phosphorous	IS:10158-1982 Reaff 2014	Kg/ha	39.46
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	151.2
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	0.84
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	143.75
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	1.04
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	0.93
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.0043
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0044
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.0042
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By

(Hema Kapuria)
Asst.Officer (QC & QA)

Authorized Signatory

Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, MIA, UDAIPUR (Rajasthan)

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Report No. 20201222067 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/09:25AM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Gotda Mohtabad
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	7.41
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff.2016	µs/cm	332.6
3.	Color	Book Practical agricultural chemistry	-	Brownish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.00
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	43.83
6.	Bulk Density	IS:1462:1985, Reaff.2017	gm/cc	1.36
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	12.48
8.	Porosity	Book Practical agricultural chemistry	%	42.02
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	0.47
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	0.82
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	12.80
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	3.84
13.	Available Phosphoroua	IS:10158-1982 Reaff 2014	Kg/ha	35.28
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	371.7
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	0.83
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	179.55
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	1.41
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	1.51
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.0071
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0036
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.0039
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By
(Hema Kapuria)
Asst.Officer (QC & QA)

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Report No. 20201222068 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/11:05AM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Gosainwala johar
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	7.32
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff 2016	µs/cm	441.2
3.	Color	Book Practical agricultural chemistry	-	Brownish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.10
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	41.08
6.	Bulk Density	IS:1462:1985, Reaff.2017	gm/cc	1.34
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	5.24
8.	Porosity	Book Practical agricultural chemistry	%	40.56
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	0.46
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	0.80
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	9.60
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	0.96
13.	Available Phosphorous	IS:10158-1982 Reaff 2014	Kg/ha	38.86
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	270.9
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	1.14
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	176.87
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	0.77
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	1.20
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.0033
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0038
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.0034
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By
(Hema Kapuria)
Asst.Officer (QC & QA)

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Report No. 20201222069 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/12:45PM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Pakhal village
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	7.73
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff.2016	µs/cm	85.55
3.	Color	Book Practical agricultural chemistry	-	Brownish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.00
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	40.90
6.	Bulk Density	IS:1462:1985, Reaff.2017	gm/cc	1.32
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	11.62
8.	Porosity	Book Practical agricultural chemistry	%	39.47
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	0.35
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	0.60
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	6.40
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	2.88
13.	Available Phosphorous	IS:10158-1982 Reaff 2014	Kg/ha	85.08
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	289.8
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	0.88
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	156.61
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	1.26
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	1.06
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.0014
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0024
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.0029
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By
(Hema Kapuria)
Asst.Officer (QC & QA)

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Report No. 20201222070 Date: 04.01.2021

TEST REPORT
(Soil)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/02:45PM
4. **Sample Received On** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of sample** : Palika bas
7. **Method of Sampling** : Handbook by S.K. Maiti

S. No	Parameters	Test Method	Unit	Results
1.	pH	IS 2720 (Part 26) 1987 Reaff 2016	-	7.54
2.	Electrical conductivity at 25 °C	IS:14767-2000, Reaff 2016	µs/cm	579.7
3.	Color	Book Practical agricultural chemistry	-	Brownish
4.	Permiability	Hand book of Method in Environmental Studies By S.K Maithi	%	1.10
5.	Water holding capacity	Hand book of Method in Environmental Studies By S.K Maithi	%	42.68
6.	Bulk Density	IS:1462:1985, Reaff 2017	gm/cc	1.18
7.	Moisture	Hand book of Method in Environmental Studies By S.K Maiti	%	9.09
8.	Porosity	Book Practical agricultural chemistry	%	46.25
9.	Organic Carbon	IS 2720 (Part 22) 1972 Reaff 2015	%	2.11
10.	Organic Matter	IS 2720 (Part 22) 1972 Reaff. 2015	%	3.64
11.	Calcium as Ca	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	8.00
12.	Manganese as Mn	USEPA 3050B (AAS FLAME) Rev., 2 Dec. 1996	mg/100gm	1.92
13.	Available Phosphorous	IS:10158-1982 Reaff 2014	Kg/ha	45.82
14.	Available Nitrogen	Standard book of Practical Agricultural chemistry	Kg/ha	340.2
15.	Total Sodium as Na	IS: 9497-1980 (Reaff. 2015)	%	1.06
16.	Available Potassium as K	IS: 9497-1980 (Reaff. 2015)	Kg/ha	163.43
17.	Sodium Absorption Ratio	SOP No.96/100 Issue date- 29.05.2017	meq/100gm	1.05
18.	Cation Exchange Capacity	Hand book of Method in Environmental Studies By S.K Maithi	meq/100gm	1.10
19.	Chloride as Cl	Handbook of Goyal,R.K & Trivedi	%	0.017
20.	Copper (as Cu)	USEPA 3050B(AAS FLAME) Rev.2 Dec. 1996	%	0.0040
21.	Zinc as Zn	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	0.0044
22.	Boron as B	USEPA 3050B (AAS FLAME) Dec. 1996 Rev. 2 1996	%	<BDL
23.	Texture	Hand book of Method in Environmental Studies By S.K Maithi	-	Sandy Loam

Tested By
(Hema Kapuria)
Asst.Officer (QC & QA)

Authorized Signatory
Dr. S.K. Yadav
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Ground & Surface Water Quality Monitoring Results

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Report No.20201222050 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 14.12.2020/11:30AM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Project site (Ground water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	20
2.	Relative Humidity	%	27

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012 Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.76	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	4189	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.8	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	2968	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff.2019	mg/L	880	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	220	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff.2019	mg/L	79.2	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	408	200	600
10.	Chlorides as Cl	IS:3025(Pt32)1988, Reaff.2019	mg/L	1065	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	0.04	0.05	1.5
12.	Fluoride as F	IS:3025(Pt60)2008 Reaff.2019	mg/L	0.7	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.92	-	-
14.	Sulphate as SO_4^-	IS:3025(Pt24)1986, Reaff.2019	mg/L	284.6	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff.2019	mg/L	12.2	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	0.41	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL<0.01	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition 2017 Part 3500-k (3-89 to 3-90)C	mg/L	8.8	-	-

Note
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Report No.20201222050 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/11:30AM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Project site (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	168.1	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	0.28	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	--
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	0.22	0.5	1
25.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS:3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	5.4	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	1.2	-	-
30.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	8.1	-	-

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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MoEFCC OHSAS Certificate No. 32004-A111

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Report No.20201222051 Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/11:50AM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Bandhawari village (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	21
2.	Relative Humidity	%	29

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.85	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	690.2	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.3	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	464	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff 2019	mg/L	290	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	96	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff.2019	mg/L	12	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	192	200	600
10.	Chlorides as Cl^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	52	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	BDL(<0.01)	0.05	1.5
12.	Fluoride as F^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	0.3	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.21	-	-
14.	Sulphate as SO_4^-	IS:3025(Pt24)1986, Reaff.2019	mg/L	28.6	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	4.1	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	BDL(<0.1)	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL<0.01	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	3.7	-	-

Note
1. **MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.**
2. **Complaint Register is available in lab / Email ID** lab.udaipur@wolkem.com/om.shukla@wolkem.com
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Report No.20201222051 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/11:50AM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Bandhawari village (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	38.2	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	BDL(<0.1)	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	–
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)	0.5	1
25.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS:3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	5.8	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	BDL(<1)	-	-
30.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	BDL(<5)	-	-

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
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Report No.20201222052 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/12:30PM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Mandi village (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	26
2.	Relative Humidity	%	32

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.8	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	1301	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.5	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	982	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff 2019	mg/L	320	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	94.4	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff.2019	mg/L	20.2	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	288	200	600
10.	Chlorides as Cl^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	184	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	BDL(<0.01)	0.05	1.5
12.	Fluoride as F^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	0.5	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.26	-	-
14.	Sulphate as SO_4^{--}	IS:3025(Pt24)1986, Reaff.2019	mg/L	106.4	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	4.4	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	0.15	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL<0.01	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	4.1	-	-

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Report No.20201222052 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/12:30PM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Mandi village (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	71.2	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	0.16	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	--
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	0.13	0.5	1
25.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS:3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	5.6	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	BDL(<1)	-	-
30.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	BDL(<5)	-	-

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Report No.20201222053 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/01:45PM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Dhankuwala johar (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	27
2.	Relative Humidity	%	35

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.92	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	805.2	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.3	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	590	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff 2019	mg/L	288	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	83.2	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff.2019	mg/L	19.2	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	218	200	600
10.	Chlorides as Cl^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	110	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	BDL(<0.01)	0.05	1.5
12.	Fluoride as F^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	0.3	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.31	-	-
14.	Sulphate as SO_4^-	IS:3025(Pt24)1986, Reaff.2019	mg/L	72.8	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	3.6	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	BDL(<0.1)	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	3.3	-	-

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Report No.20201222053

Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 14.12.2020/01:45PM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Dhankuwala johar (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	42.2	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	BDL(<0.1)	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	--
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)	0.5	1
25.	Cyanide	APHA 22nd Editon	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS:3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	5.8	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	BDL(<1)	-	-
30.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	BDL(<5)	-	-

BDL-Below Detection Limit

Tested By

(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory

(Dr. S. K. Yadav)
Chief Manager (Environment)
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Report No.20201222054 Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/09:45AM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Goptda Mohtabad (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	23
2.	Relative Humidity	%	31

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	7.15	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	983.6	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.4	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	652	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff 2019	mg/L	380	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	75.2	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff.2019	mg/L	46.1	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	242	200	600
10.	Chlorides as Cl^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	126	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	BDL(<0.01)	0.05	1.5
12.	Fluoride as F^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	0.4	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.26	-	-
14.	Sulphate as SO_4^-	IS:3025(Pt24)1986, Reaff.2019	mg/L	53.2	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	3.8	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	0.11	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	3.8	-	-

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Report No.20201222054 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/09:45AM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Goptda Mohtabad (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	47.4	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	0.13	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	--
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)	0.5	1
25.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS:3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	6	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	BDL(<1)	-	-
30.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	BDL(<5)	-	-

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.
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5. The samples will be destroyed after 15 days from the date of issue of test certificate unless otherwise specified.
6. Any discrepancy in test results should be reported within 15 days.

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___End of Report___

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Report No.20201222055 Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/11:15AM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Gosainwala jahar (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	23
2.	Relative Humidity	%	33

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012 Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	7.22	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	689.4	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.4	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	438	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff 2019	mg/L	276	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	54.4	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff 2019	mg/L	33.6	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	178	200	600
10.	Chlorides as Cl^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	48	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	BDL(<0.01)	0.05	1.5
12.	Fluoride as F^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	0.3	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.23	-	-
14.	Sulphate as SO_4^-	IS:3025(Pt24)1986, Reaff.2019	mg/L	41.4	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	3.9	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	BDL(<0.1)	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	2.9	-	-

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Note
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www.wolkem.com

Report No.20201222055

Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 15.12.2020/11:15AM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Gosainwala jahar (Ground water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	38.6	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	0.11	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	--
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)	0.5	1
25.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS:3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	5.9	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	BDL(<1)	-	-
30.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	BDL(<5)	-	-

BDL-Below Detection Limit .

Tested By

(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA
ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory

(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Report No.20201222056 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/12:25PM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Pakhal village (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	22
2.	Relative Humidity	%	32

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	7.27	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	1121	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.5	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	726	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff 2019	mg/L	308	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	67.2	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff.2019	mg/L	33.6	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	256	200	600
10.	Chlorides as Cl^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	146	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	BDL(<0.01)	0.05	1.5
12.	Fluoride as F^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	0.4	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.33	-	-
14.	Sulphate as SO_4^-	IS:3025(Pt24)1986, Reaff.2019	mg/L	68.6	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	4.1	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	0.18	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	3.5	-	-

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MoEFCC OHSAS Certificate No. 33024-A111

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Report No.20201222056 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 15.12.2020/12:25PM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Pakhal village (Ground water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	57.8	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	0.18	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	--
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)	0.5	1
25.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS:3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	5.7	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	BDL(<1)	-	-
30.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	BDL(<5)	-	-

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
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Report No.20201222057

Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/02:20PM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Pakila Bas (Ground water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	24
2.	Relative Humidity	%	35

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.58	6.5 to 8.5	No Relaxation
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	4081	-	-
3.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable	Agreeable	Agreeable
4.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	0.7	1	5
5.	Total Dissolve Solid	IS:3025(Pt16)1984, Reaff.2017	mg/L	2794	500	2000
6.	Total Hardness as $CaCo_3$	IS:3025(Pt21)2009 Reaff 2019	mg/L	1120	200	600
7.	Calcium as Ca^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	252	75	200
8.	Magnesium as Mg^{2+}	IS:3025(Pt46)1994 Reaff.2019	mg/L	117.6	30	100
9.	Alkalinity	IS:3025(Pt23)1986, Reaff.2019	mg/L	388	200	600
10.	Chlorides as Cl^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	1015	250	1000
11.	Copper	IS:3025(Pt42)1992, Reaff.2019	mg/L	0.08	0.05	1.5
12.	Fluoride as F^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	0.6	1.0	1.5
13.	Phosphate	IS:3025 1988(Pt31) Reprint & Reaff 2019	mg/L	0.18	-	-
14.	Sulphate as SO_4^{--}	IS:3025(Pt24)1986, Reaff.2019	mg/L	268.4	200	400
15.	Nitrate as NO_3	IS:3025(Pt34-3-B)1988 Reaff.2019	mg/L	19.2	45	No Relaxation
16.	Zinc	IS 3025(P49)1994 RA 2019(a) AAS	mg/L	0.54	5	15
17.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)	0.01	No Relaxation
18.	Potassium as K	APHA 23rd Edition 2017 Part 3500-k (3-89 to 3-90)	mg/L	7.5	-	-

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Note

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OHSAS Certificate No. 32324-A111

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Report No.20201222057 Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 15.12.2020/02:20PM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Pakila Bas (Ground water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results	Limits :- IS-10500:2012	
					Acceptable	Permissible
19.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	146.5	-	-
20.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	0.32	0.3	No Relaxation
21.	Cadmium	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.01)	0.003	No relaxation
22.	Total Chromium	IS:3025(Pt52)200 Reaff 2019	mg/L	BDL(<0.02)	-	-
23.	Mercury	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.001)	0.001	No relaxation
24.	Boron	IS:3025(Pt57)2005 Reaff 2017	mg/L	0.19	0.5	1
25.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)	0.05	No Relaxation
26.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)	0.01	0.05
27.	Phenolic compounds	IS 3025(Part43)1992	mg/L	BDL(<0.001)	0.001	0.002
28.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	5.8	-	-
29.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	1.1	-	-
30.	Chemical Oxygen Demand	IS 3025(Pt58)2006 Reaff 2017	mg/L	8.1	-	-

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

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Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com
www.wolkem.com

Report No.20201222058 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 14.12.2020/02:45PM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Pond water near bandhawari village (Surface water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	24
2.	Relative Humidity	%	31

S. No.	Parameters	Test Method	Unit	Results
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.85
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	388.4
3.	Color	IS:3025(Pt4)1983, Reaff.2017	Hazen	15
4.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable
5.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	2.1
6.	Total Dissolve Solid	IS:3025(Pt17)1984, Reaff.2017	mg/L	274
7.	Total Hardness as $CaCo_3$	IS:3025(Pt16)1984, Reaff.2017	mg/L	116
8.	Calcium as Ca^{2+}	IS:3025(Pt21)2009 Reaff 2019	mg/L	25.6
9.	Magnesium as Mg^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	12.5
10.	Alkalinity	IS:3025(Pt46)1994 Reaff.2019	mg/L	78
11.	Chlorides as Cl^-	IS:3025(Pt23)1986, Reaff.2019	mg/L	26
12.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	6.2
13.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	1.4
14.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	8.1
15.	Fluoride as F^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	0.3
16.	Sulphate as SO_4^{--}	IS:3025(Pt50)2008 Reaff 2019	mg/L	20.2
17.	Nitrate as NO_3	IS:3025(Pt24)1986, Reaff.2019	mg/L	2.6
18.	Free Ammonia	APHA 23rd Edition 4500-NH3 (4-114)	mg/L	0.6

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Report No.20201222058 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 14.12.2020/02:45PM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Pond water near bandhawari village (Surface water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results
19.	Zinc	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	BDL(<0.1)
20.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)
21.	Potassium as K	APHA 23rd Edition.2017 Part 3500-k (3-89 to 3-90)	mg/L	2.4
22.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	24.7
23.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	BDL(<0.1)
24.	Cadmium	IS:3025(Pt26)1986 Reaff 2019	mg/L	BDL(<0.01)
25.	Copper	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)
26.	Mercury	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.001)
27.	Boron	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.1)
28.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)
29.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
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Report No.20201222059 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 14.12.2020/04:25PM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Niharika Lake (Surface water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	26
2.	Relative Humidity	%	32

S. No.	Parameters	Test Method	Unit	Results
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	7.31
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	457.2
3.	Color	IS:3025(Pt4)1983, Reaff.2017	Hazen	<5
4.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable
5.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	1.8
6.	Total Dissolve Solid	IS:3025(Pt17)1984, Reaff.2017	mg/L	290
7.	Total Hardness as $CaCo_3$	IS:3025(Pt16)1984, Reaff.2017	mg/L	166
8.	Calcium as Ca^{2+}	IS:3025(Pt21)2009 Reaff 2019	mg/L	32.8
9.	Magnesium as Mg^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	20.2
10.	Alkalinity	IS:3025(Pt46)1994 Reaff.2019	mg/L	72
11.	Chlorides as Cl^-	IS:3025(Pt23)1986, Reaff.2019	mg/L	48
12.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	6.4
13.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	1.6
14.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	8.1
15.	Fluoride as F^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	0.2
16.	Sulphate as SO_4^{--}	IS:3025(Pt60)2008 Reaff 2019	mg/L	19.8
17.	Nitrate as NO_3	IS:3025(Pt24)1986, Reaff.2019	mg/L	2.8
18.	Free Ammonia	APHA 23rd Edition 4500-NH3 (4-114)	mg/L	BDL(<0.5)

Note
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Report No.20201222059 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 14.12.2020/04:25PM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Niharika Lake (Surface water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results
19.	Zinc	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	BDL(<0.1)
20.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)
21.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	2.1
22.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	19.6
23.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	BDL(<0.1)
24.	Cadmium	IS:3025(Pt26)1986 Reaff 2019	mg/L	BDL(<0.01)
25.	Copper	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)
26.	Mercury	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.001)
27.	Boron	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.1)
28.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)
29.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ENVIRONMENTAL CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
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E-102, M.I.A., UDAIPUR (Rajasthan)

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Report No.20201222060 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/11:05AM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : Lake Shail (Surface water)
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	22
2.	Relative Humidity	%	28

S. No.	Parameters	Test Method	Unit	Results
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	7.79
2.	Conductivity (at 25°C)	IS:3025-1964(Pt14) Reaff.2019	µs	550.2
3.	Color	IS:3025(Pt4)1983, Reaff.2017	Hazen	<5
4.	Odour	IS 3025 (Part- 5)198 Reaff.2018	-	Agreeable
5.	Turbidity	IS:3025(Pt10)1984, Reaff.2017	NTU	1.4
6.	Total Dissolve Solid	IS:3025(Pt17)1984, Reaff.2017	mg/L	326
7.	Total Hardness as $CaCo_3$	IS:3025(Pt16)1984, Reaff.2017	mg/L	180
8.	Calcium as Ca^{2+}	IS:3025(Pt21)2009 Reaff 2019	mg/L	40
9.	Magnesium as Mg^{2+}	IS:3025(Pt40)1991, Reaff.2019	mg/L	19.2
10.	Alkalinity	IS:3025(Pt46)1994 Reaff.2019	mg/L	84
11.	Chlorides as Cl^-	IS:3025(Pt23)1986, Reaff.2019	mg/L	64
12.	Dissolve Oxygen	IS:3025(Pt38)1989, Reaff.2019	mg/L	6.3
13.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	1.8
14.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	10.7
15.	Fluoride as F^-	IS:3025(Pt32)1988, Reaff.2019	mg/L	0.4
16.	Sulphate as SO_4^-	IS:3025(Pt60)2008 Reaff 2019	mg/L	24.4
17.	Nitrate as NO_3	IS:3025(Pt24)1986, Reaff.2019	mg/L	2.9
18.	Free Ammonia	APHA 23rd Edition 4500-NH3 (4-114)	mg/L	BDL(<0.5)

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Report No.20201222060 Date: - 04.01.2021

TEST REPORT
(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 15.12.2020/11:05AM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : Lake Shail (Surface water)
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No.	Parameters	Test Method	Unit	Results
19.	Zinc	IS:3025(Pt34-3-B)1988 Reaff 2019	mg/L	BDL(<0.1)
20.	Lead	IS 3025(P47)1994 RA 2019(a) AAS	mg/L	BDL(<0.01)
21.	Potassium as K	APHA 23rd Edition,2017 Part 3500-k (3-89 to 3-90)	mg/L	2.2
22.	Sodium as Na	APHA 23rd Edition2017 Part 3500-Na(3-99 to 3-90)	mg/L	22.1
23.	Iron as Fe	IS:3025(Pt53)2003, Reaff.2019	mg/L	BDL(<0.1)
24.	Cadmium	IS:3025(Pt26)1986 Reaff 2019	mg/L	BDL(<0.01)
25.	Copper	IS:3025(Pt57)2005 Reaff 2017	mg/L	BDL(<0.1)
26.	Mercury	IS 3025 (P-41)-1992 RA 2019 (a) AAS	mg/L	BDL(<0.001)
27.	Boron	IS:3025(Pt48)1994 Reaff 2019	mg/L	BDL(<0.1)
28.	Arsenic	IS:3025(Part 37) 1988	mg/L	BDL(<0.01)
29.	Cyanide	APHA 22nd Edition	mg/L	BDL(<0.01)

BDL-Below Detection Limit

Tested By
(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory
(Dr. S. K. Yadav)
Chief Manager (Environment)
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E-102, M.I.A., UDAIPUR (Rajasthan)

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Report No.20201222061

Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase order Number : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Date & Time of Sampling : 15.12.2020/03:00PM
4. Sample received on : 22.12.2020
5. Period of Analysis : 22.12.2020 to 04.01.2021
6. Name of Sample & Location : ETP Inlet water
7. Method of Sampling : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	25
2.	Relative Humidity	%	32

S. No.	Parameters	Test Method	Unit	Results
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.39
2.	Total Dissolve Solid	IS:3025(Pt17)1984, Reaff.2017	mg/L	25620
3.	Total Suspended Solid	IS:3025(Pt17)1984 Reaff 2017	mg/L	2634
4.	Oil & Grease	IS:3025(Pt39)1991 Reaff 2019	mg/L	425
5.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	8700
6.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	18620

BDL-Below Detection Limit

Tested By

(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA
ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory

(Dr. S. K. Yadav)
Chief Manager (Environment)
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Wolkem INDIA LIMITED
Laboratory : E- 102, Mewar Industrial Area, Madri, Udaipur - 313003, Rajasthan (INDIA)
Phone : 01 294 2494600 to 02 E-mail : info.wcs@wolkem.com
www.wolkem.com

Report No.20201222062

Date: - 04.01.2021

TEST REPORT

(Water/Waste water)

1. **Name of Customer** : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. **Purchase order Number** : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. **Date & Time of Sampling** : 15.12.2020/03:05PM
4. **Sample received on** : 22.12.2020
5. **Period of Analysis** : 22.12.2020 to 04.01.2021
6. **Name of Sample & Location** : ETP Outlet water
7. **Method of Sampling** : IS: 3025 (Pt 1) 1987

S. No	Environment Condition	Unit	Results
1.	Ambient Temperature	°C	25
2.	Relative Humidity	%	32

S. No.	Parameters	Test Method	Unit	Results
1.	pH (at 25°C)	IS:3025(Pt11)1983, Reaff.2017	-	6.54
2.	Total Dissolve Solid	IS:3025(Pt17)1984, Reaff.2017	mg/L	6176
3.	Total Suspended Solid	IS:3025(Pt17)1984 Reaff 2017	mg/L	18
4.	Oil & Grease	IS:3025(Pt39)1991 Reaff 2019	mg/L	BDL(<0.4)
5.	B.O.D. 3 days @ 27°C	IS:3025(Pt44)1993, Reaff.2019	mg/L	216
6.	Chemical Oxygen Demand	IS:3025(Pt58)2006 Reaff 2017	mg/L	592.8

BDL-Below Detection Limit

Tested By

(Puran Singh)
Chemist

RECOGNIZED BY MOEF, CC GOVERNMENT OF INDIA ★ ENVIRONMENTAL & CHEMICAL LABORATORY

Authorized Signatory

(Dr. S. K. Yadav)
Chief Manager (Environment)
Environmental & Chemical Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note

1. **MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1357 is valid from 02.06.2016 to 01.06.2021.**
2. **Complaint Register is available in lab / Email ID** lab.office@wolkem.com/om.shukla@wolkem.com
3. The results listed refer only to the tested sample (s) and parameter (s) Endorsement of product is neither inferred nor implied.
4. This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing.
5. The samples will be destroyed after 15 days from the date of issue of test certificate unless otherwise specified.
6. Any discrepancy in test results should be reported within 15 days.

Page 1 of 1

End of Report

Wolkem INDIA LIMITED
Laboratory : E- 102, Mewar Industrial Area, Madri, Udaipur - 313003, Rajasthan (INDIA)
Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com
www.wolkem.com

Date- 28.12.2020

TEST REPORT
(MICROBIOLOGY)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase Order No. : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Sample Identification : Clean water
4. Condition of sample : Sealed/Ok
5. Source/ Location : Mention In Table
6. Sampling done by : Environmental & Chemical Laboratory ,Wolkem India Limited
7. Sample Received on : 22.12.2020
8. Period of Testing : 22.12.2020 to 28.12.2020
9. Environmental conditions : Temp.25°C/ RH 37%
10. Sampling method : IS: 1622-1981 (Reaff 2019)

S. No.	Registration No.	Name of Sample	Test Method	Result		Limits As Per IS 10500:2012
				E.coli (MPN/100ml)	Total Coliforms (MPN/100ml)	
1.	20201222169	Project site	IS 1622-1981 Reaff. 2019	140	900	Shall not be Detectable/100ml
2.	20201222170	Bandhwari village	IS 1622-1981 Reaff. 2019	60	300	
3.	20201222171	Mandi village	IS 1622-1981 Reaff. 2019	90	500	
4.	20201222172	Dhankuwala johar	IS 1622-1981 Reaff. 2019	90	350	
5.	20201222173	Gotda Mohtabad	IS 1622-1981 Reaff. 2019	70	500	
6.	20201222174	Gosainwala johar	IS 1622-1981 Reaff. 2019	50	300	
7.	20201222175	Pakhal village	IS 1622-1981 Reaff. 2019	70	500	
8.	20201222176	Palika bas	IS 1622-1981 Reaff. 2019	130	900	

Authorized Signatory
Amreesh Kumar
(Chief Manager)
Microbiology Testing Laboratory
Wolkem India Limited
E-102, M.I.A. (RIICO) Madri, Udaipur

Note:
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1157 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com/sm.dholia@wolkem.com
3. The results listed refer only to the tested sample (s) and parameters (s) Endorsement of product is neither inferred nor implied.
4. This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing.
5. The samples will be destroyed after 07 days from the date of issue of test certificate unless otherwise specified.
6. Any discrepancy in test results should be reported within 03 days.
7. Bacteriological Quality of Drinking Water as per IS 10500:2012

S. No.	Organisms	Requirements
1	All water intended for drinking a. E. Coli	Shall not be detectable in any 100 ml sample
2	Treated water entering the distribution system a. E. coli b. Total coliform bacteria	Shall not be detectable in any 100 ml sample Shall not be detectable in any 100 ml sample

Page 1 of 1
End of Report

Wolkem INDIA LIMITED
Laboratory : E- 102, Mewar Industrial Area, Madri, Udaipur - 313003, Rajasthan (INDIA)
Phone : 91 294 2494600 to 02 E-mail : info.wcs@wolkem.com
www.wolkem.com

Date- 28.12.2020

TEST REPORT
(MICROBIOLOGY)

1. Name of Customer : Municipal Corporation of Gurugram, Integrated municipal solid waste management processing facility at Bandhwari village, District – Gurugram, State – Hariyana, (Area- 30.5 ACRES)
2. Purchase Order No. : EEGFPL/WIL/19-20/410 Dated: - 06.03.2020
3. Sample Identification : Clean water
4. Condition of sample : Sealed/Ok
5. Source/ Location : Mention In Table
6. Sampling done by : Environmental & Chemical Laboratory ,Wolkem India Limited
7. Sample Received on : 22.12.2020
8. Period of Testing : 22.12.2020 to 28.12.2020
9. Environmental conditions : Temp.25°C/ RH 37%
10. Sampling method : IS: 1622-1981 (Reaff 2019)

S. No.	Registration No.	Name of Sample	Test Method	Result		Limits As Per IS 10500:2012
				E.coli (MPN/100ml)	Total Coliforms (MPN/100ml)	
1.	20201222177	Pond Nr. Bandhwari village	IS 1622-1981 Reaff. 2019	<2MPN	60	Shall not be Detectable/100ml
2.	20201222178	Niharika lake	IS 1622-1981 Reaff. 2019	<2MPN	50	
3.	20201222179	Lake shail	IS 1622-1981 Reaff. 2019	<2MPN	90	

Authorized Signatory
Amreesh Kumar
(Chief Manager)
Microbiology Testing Laboratory
Wolkem India Limited
E-102, M.I.A., UDAIPUR (Rajasthan)

Note:
1. MoEFCC, New Delhi recognition under the Environment (Protection) Act 1986, vide gazette notification no. 1307 is valid from 02.06.2016 to 01.06.2021.
2. Complaint Register is available in lab / Email ID lab.office@wolkem.com/om.shukla@wolkem.com
3. The results listed refer only to the tested sample (s) and parameters (s) Endorsement of product is neither inferred nor implied.
4. This report is not to be reproduced wholly or in part and cannot be used as evidence in the court of law and should not be used in any advertising media without our special permission in writing.
5. The samples will be destroyed after 07 days from the date of issue of test certificate unless otherwise specified.
6. Any discrepancy in test results should be reported within 03 days.

Page 1 of 1
__End of Report__

ANNEXURE-IX

RDF QUALITY REPORT OF SIMILAR PLANT IN INDIA

The typical analysis reports of the waste are as follows:

Fresh Waste-RDF			
Parameters	**Test Method**	**Unit**	**Average**
Proximate Analysis			
Moisture	ASTM D3173-87(1996)	%	35.4
Total Ash	ASTM D3174-97	%	20.08
Volatile Matter	ASTM D317589a(1997)	%	24.56
Fixed Carbon	ASTM D3172-89(1997)	%	19.96
Ultimate Analysis			
Moisture	ASTM D3173-87(1996)	%	35.4
Total Ash	ASTM D3174-97	%	20.08
Carbon Content	ASTM D3178-89(1997)	%	22.01
Hydrogen	ASTM D3178-89(1997)	%	5.87
Sulphur	ASTM D3177-89(1997)	%	0.92
Oxygen	ASTM D3176-89(1997)	%	15.02
Nitrogen	ASTM D3179-89(1997)	%	0.7
GCV (on air dry basis)	Bomb calorimeter	Cal/gm	2477
NCV (on air dry basis)	Bomb calorimeter	Cal/gm	1962
GCV (on receive basis)	Bomb calorimeter	Cal/gm	1600
NCV (on receive basis)	Bomb calorimeter	Cal/gm	1267.9

Source: *Detailed project Report (DPR) of IMSWM-WTE of 25 MW capacity*

Legacy Waste-RDF			
Parameters	**Test Method**	**Unit**	**Average**
Proximate Analysis			
Moisture	ASTM D3173-87(1996)	%	12.88
Total Ash	ASTM D3174-97	%	21.43
Volatile Matter	ASTM D3175-89a(1997)	%	40.07
Fixed Carbon	ASTM D3172-89(1997)	%	25.62

Ultimate Analysis			
Moisture	ASTM D3173-87(1996)	%	12.88
Total Ash	ASTM D3174-97	%	21.43
Carbon Content	ASTM D3178-89(1997)	%	44.08
Hydrogen	ASTM D3178-89(1997)	%	5.81
Sulphur	ASTM D3177-89(1997)	%	0.62
Oxygen	ASTM D3176-89(1997)	%	14.89
Nitrogen	ASTM D3179-89(1997)	%	0.29
GCV (on air dry basis)	Bomb calorimeter	Cal/gm	2645
NCV (on air dry basis)	Bomb calorimeter	Cal/gm	2264
GCV (on receive basis)	Bomb calorimeter	Cal/gm	2304
NCV (on receive basis)	Bomb calorimeter	Cal/gm	1972.4

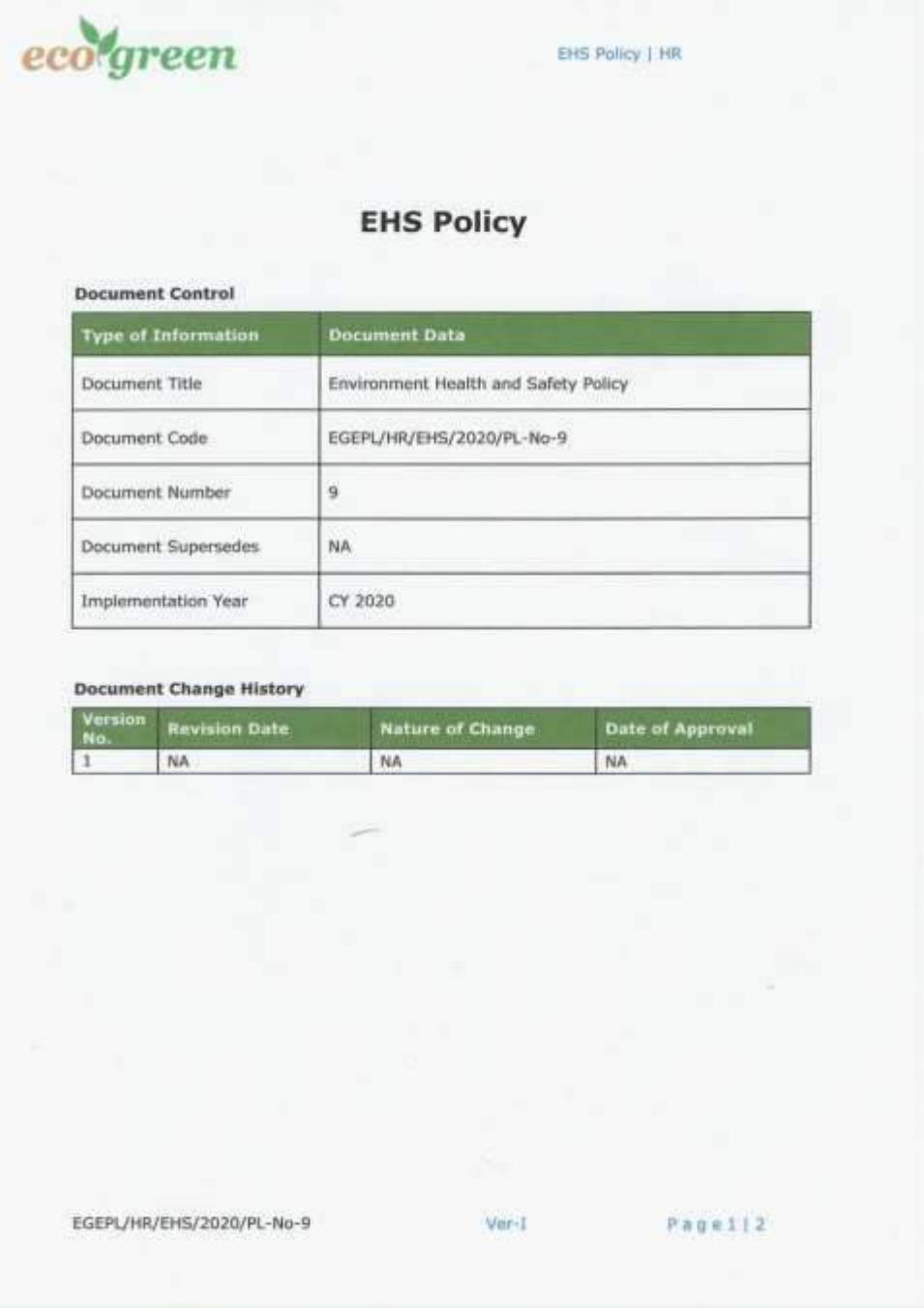
Source: *Detailed project Report (DPR) of IMSWM-WTE of 25 MW capacity*

Considering the calorific value of RDF especially Legacy Waste-RDF and the adaptability of the MSW calorific value after operation, it is recommended that the design LHV of the MSW in the project is 1400kcal / kg. The range of LHV is 4187kJ/kg∼8374kJ/kg (1000kcal/kg∼2000kcal/kg).

ANNEXURE-X

EHS Policy

M/s. Ecogreen Energy Gurugram – Faridabad Private Limited



ecogreen

EHS Policy | HR

EHS Policy

Document Control

Type of Information	Document Data
Document Title	Environment Health and Safety Policy
Document Code	EGEPL/HR/EHS/2020/PL-No-9
Document Number	9
Document Supersedes	NA
Implementation Year	CY 2020

Document Change History

Version No.	Revision Date	Nature of Change	Date of Approval
1	NA	NA	NA

EGEPL/HR/EHS/2020/PL-No-9 Ver-I Page 1 | 2

ecogreen

EHS Policy | HR

1. Purpose & Scope

Ecogreen believes Environment, Occupational Health & Safety is the most important aspects of the organization to set its oars heading way to ultimate objective of uninterrupted power generation, through adoption of a structured approach for the identification of significant aspects/risks, their evaluation and control of the impact.

2. Policy Highlights

The Company and its members are committed to provide a safe and healthy working environment and comply with all regulations for the preservation of the environment of the territory it operates in during the course of its operations.
The Company and its members shall be committed to prevent the wastage of natural resources and minimize any hazardous impact of the development, production, use & disposal of any of its products and services on the ecological environment.
The Company as a responsible corporate citizen shall consider its obligation to maintain highest standards of the environmental management and ensure for all its members, consultants, contractors, and customers a safe and healthy environment free from occupational injury & diseases.
The Company & its members shall pursue high standards of safety, health and environmental management as an integral part of efficient management of the business ensuring that all business decisions are taken after considering the safety, health and environmental implications).

3. Policy

- To contribute to sustainable development through the establishment and implementation of environment standards that are scientifically tested and meet the requirement of relevant laws, regulations and codes of practice.
- To inculcate the principles of safety, health and environmental care in its people and processes on continuous basis for enhancing EHS culture.
- To provide appropriate training and disseminate information to enable all employees to accept individual responsibility for environment, health and safety, implement best practices, and work in partnership to create a culture of continuous improvement.
- To instil a sense of duty in every employee towards personal safety, as well as that of others who may be affected by the employee's actions.
- To provide and maintain facilities, equipment, operations and working conditions which are safe for employees, visitors and contractors at the Company's premises.
- To ensure safe handling, storage, use and disposal of all substances and materials that are classified as hazardous to health and environment.
- To continually work on cost effective technological intervention to minimize risk to human beings, property and reduce adverse environmental impact through adoption of elimination, substitution, reduction, recycling, reuse and recovery at source.
- Setting time bound objectives to control health and safety hazards and to minimize various kinds of environment pollution including solid waste.

All employees of Ecogreen are expected to adhere to and comply with the EHS Policy and Corporate Standards on EHS.

Authorized Signatory

ANNEXURE-XI

FLY ASH ANALYSIS REPORT OF SIMILAR PLANT IN INDIA

Sophisticated Industrial Materials Analytic Labs. Pvt. Ltd.

ISO CERTIFIED • NABL ACCREDITED • FSSAI, BIS & MoEF RECOGNISED • GOVT. APPROVED TESTING LABORATORIES

5.10 F-01

TEST REPORT

PARTY CODE : M/DLH/12309
M/S JABALPUR MSW PVT. LTD.

KHSRA NO. 375,376 & 379, NEAR SAMDARIYA GREEN CITY, VILLAGE KATHONDA, JABALPUR (MP)

REPORT NO. : SD0131000119
REF. NO. : NS
REF. DATE : 31/01/2019
DT.RECD : 31/01/2019

SAMPLE NAME : FLY ASH

RESULTS OF ANALYSIS
Reference : IRC SP - 58 -1999

DESCRIPTION : One sample of Fly Ash was received on 31/01/2019

SAMPLING DATE : 31/01/2019 SAMPLE QTY. : 30 KG

S.No.	Test Parameters	Unit	Results	Requirement	Method
1.	Maximum Dry Density	gm/cc	1.42	0.9-1.6	IS:2720(P-8)
2.	Optimum Moisture Content	%	22.6	18-38	IS:2720(P-8)
3.	Plasticity Index	%	NP	Non Plastic	IS:2720(P-5)
4.	CBR (unsoaked)	%	6.8	-	IS:2720 (P-16)
5.	DBD	kg/ltr.	1.30	-	IS:2386 (P-3)
6.	Fineness Modulus	%	2.0	-	By Calculation
7.	Particle Size Analysis	-	-	-	IS:2720 (P-4)
	(a) Gravel	%	0	0-10	-
	(b) Sand	%	40.6	7-90	-
	(c) Silt	%	57.6	8-85	-
	(d) Clay	%	1.8	1-10	-
8.	Field Dry Density	-	1.37	-	IS:2720 (P-29)
9.	Degree of Compaction	%	96.5	95%	IS:2720(P-29)

Date of performance : 31/01/2019 to 06/02/2019

DATE : 06/02/2019 ANALYST AUTHORISED SIGNATORY

REMARKS 1. Results listed refer only to the tested sample & applicable parameters. Endorsement of products is neither inferred nor implied. Page: 1 of 1
2. Liability of laboratory is limited to the invoiced amount only. Any dispute arising out of this report shall be subject to Delhi jurisdiction only.
3. This Report is not to be reproduced wholly or in part and cannot be used as an evidence in the Court of law and should not be used in any advertising media without special permission in writing.
4. Sample shall be disposed off after issue of Test Report unless specified.
5. A complaint register is available with the laboratory. Sonip

Sophisticated Industrial Materials Analytic Labs. Pvt. Ltd.

ISO CERTIFIED • NABL ACCREDITED • FSSAI BIS & MoEF RECOGNISED • GOVT. APPROVED TESTING LABORATORIES

5.10 F-01

TEST REPORT

PARTY CODE : M/DLH/12309
M/S JABALPUR MSW PVT. LTD.

KHSRA NO. 375,376 & 379, NEAR SAMDARIYA GREEN CITY, VILLAGE KATHONDA, JABALPUR (MP)

REPORT NO. : SD0130000119
REF. NO. : NS
REF. DATE : 30/01/2019
DT.RECD : 30/01/2019

SAMPLE NAME : BOTTOM ASH

RESULTS OF ANALYSIS
Reference : IRC SP - 58 -1999

DESCRIPTION : One sample of Bottom Ash was received on 30/01/2019

SAMPLING DATE : 30/01/2019 SAMPLE QTY. : 30 KG

S.No.	Test Parameters	Unit	Results	Requirement	Method
1.	Maximum Dry Density	gm/cc	1.46	0.9-1.6	IS:2720 (P-8)
2.	Optimum Moisture Content	%	20.8	18-38	IS:2720 (P-8)
3.	Plasticity Index	%	NP	Non Plastic	IS:2720 (P-5)
4.	CBR	%	7.2	-	IS:2720 (P-16)
5.	DBD	kg/ltr.	1.36	-	IS:2386 (P-3)
6.	Fineness Modulus	%	2	-	By Calculation
7.	Particle Size Analysis	-	-	-	IS:2720(P-4)
	(a) Grarel	%	0	0-10	-
	(b) Sand	%	38.3	7-90	-
	(c) Silt	%	55.4	8-85	-
	(d) Clay	%	6.3	1-10	-
8	Field Dry Density	gm/cc	1.41	-	IS:2720(P-29)
9	Degree of Compaction	%	96.6	Min 95	IS:2720(P-29)

Date of performance : 30/01/2019 to 06/02/2019

DATE : 06/02/2019

ANALYST AUTHORISED SIGNATORY

REMARKS 1. Results listed refer only to the tested sample & applicable parameters. Endorsement of products is neither inferred nor implied. Page: 1 of 1
2. Liability of laboratory is limited to the invoiced amount only. Any dispute arising out of this report shall be subject to Delhi jurisdiction only.
3. This Report is not to be reproduced wholly or in part and cannot be used as an evidence in the Court of law and should not be used in any advertising media without special permission in writing.
4. Sample shall be disposed off after issue of Test Report unless specified.
5. A complaint register is available with the laboratory.

Suraj

ANNEXURE-XII

NOC FROM AIRPORT AUTHORITY OF INDIA

भारतीय विमानपत्तन प्राधिकरण
AIRPORTS AUTHORITY OF INDIA

AAI/RHQ/NR/ATM/NOC/2018/288/1517-1520.

Ecogreen Energy Pvt Ltd
603-607, ILD Trade Centre, Sec 47, Sohna Road, Gurgaon, Haryana-122001

Date: 04-09-2018
Valid Upto: 03-09-2026

No Objection Certificate for Height Clearance

1. This NOC is issued by Airports Authority of India (AAI) in pursuance of responsibility conferred by and as per the provisions of Govt. of India (Ministry of Civil Aviation) order GSR751 (E) dated 30th Sep. 2015 for Safe and Regular Aircraft Operations.

2. This office has no objection to the construction of the proposed structure as per the following details:

NOC ID :	**PALM/NORTH/B/082018/327361**
Applicant Name*	**Sanjeev Kumar**
Site Address*	**Gurgaon Faridabad Combined Waste Management Plant at Faridabad Road, Bandhwari Village, Gurgaon,Village Bandhwari / Gurgaon,Gurgaon,Haryana**
Site Coordinates*	**77 10 11.09-28 24 03.85, 77 10 16.97-28 24 14.77, 77 10 14.80-28 24 07.82, 77 10 19.10-28 24 01.25, 77 10 27.61-28 24 13.09**
Site Elevation in mtrs AMSL as submitted by Applicant*	**306.67 M**
Permissible Top Elevation in mtrs Above Mean Sea Level(AMSL)	**366.67 M**

*As provided by applicant

3. This NOC is subject to the terms and conditions as given below:

a. Permissible Top elevation has been issued on the basis of Site coordinates and Site Elevation submitted by Applicant. AAI neither owns the responsibility nor authenticates the correctness of the site coordinates & site elevation provided by the applicant. If at any stage it is established that the actual data is different, this NOC will stand null and void and action will be taken as per law. The office in-charge of the concerned aerodrome may initiate action under the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules, 1994"

b. The Site coordinates as provided by the applicant in the NOC application has been plotted on the street view map and satellite map as shown in ANNEXURE. Applicant/Owner to ensure that the plotted coordinates corresponds to his/her site.In case of any discrepancy,Designated Officer shall be requested for cancellation of the NOC.

c. Airport operator or his designated representative may visit the site (with prior coordinations with applicant or owner) to ensure that NOC terms & conditions are complied with.

d. The Structure height (including any superstructure) shall be calculated by subtracting the Site elevation in AMSL from the Permissible Top Elevation in AMSL i.e. Maximum Structure Height = Permissible Top Elevation minus (-) Site Elevation.

e. The issue of the 'NOC' is further subject to the provisions of Section 9-A of the Indian Aircraft Act, 1934 and any notifications issued there under from time to time including the Aircraft (Demolition of Obstruction caused by Buildings and Trees etc.) Rules,1994.

क्षेत्रीय मुख्यालय उत्तरी क्षेत्र, परिचालन कार्यालय परिसर रंगपुरी, नई दिल्ली - 110037 दूरभाष संख्या - 91-11-25653566
Regional headquarter Northern Region, Operational Offices Complex Rangpuri, New Delhi-110 037 Tel: 91-11-25653566
" हिंदी पत्रों का स्वागत है ।"

S.K.Pawar
एस. के. पवार
S. K. Pawar

ANNEXURE-XIII

AUTHENTIC LIST OF SCHEDULE –I & II SPECIES IN STUDY AREA

Authenticated List Of Fauna (Schedule I & II) found in and around buffer area of project site of Solid Waste Management facility at Bandhwari District Gurugram.

Mammals :

1. Leopard (Panthera pardus) -I
2. Jackal (Canisaureus) -II P-II
3. Jungle cat (Felischaus) -II P-II
4. Common mongoose (Herpestes edwardsII) -II P-II
5. Langoor (Presbytis entellus) -IIP-I
6. Common Monkey (Macacamulatta) -II P-I
7. Civet Cats (Viverridae family) - II P-II

Birds :

1. Peafowl (Pavo cristatus) -I
2. Black Partridge (Melanoperdix niger) -I

Reptiles :

1. Indian Cobra (Najanaja) -II P-II
2. Russell's Viper (Vipera russelli) -II P-II
3. Common Indian Krait (Bungaruscaeruleus) -II
4. Indian Monitor Lizard (Veranusbengaleneses) -I
5. Common Rat Snake (Ptyasmucosus) -II P-II
6. Python (Genus python) -I

Inspector Wild Life
Distt. Gurugram
H.Q. Sohna

ANNEXURE-XIV

SPECIFIC CONSERVATION PLAN OF SCHEDULE –I & II SPECIES IN STUDY AREA

Table 1 : List of Schedule I fauna observed in the study area

S. No	Common Name	Scientific Name	Schedule as per WPA 1972
1	Leopard	*Panthera pardus*	Schedule I
2	Jackal	*Canisaureus*	Schedule II
3	Jungle Cat	*Felischaus*	Schedule II
4	Common Mongoose	*Herpestes edwardsi*	Schedule II
5	Langoor	*Presbytis entellus*	Schedule II
6	Common Monkey	*macacamulatta*	Schedule II
7	Civet Cats	*Viverridae Family*	Sch II (Part I)
8	Indian Peafowl	*Pavo cristatus*	Schedule I
9	Black Partridge	*Melanoperdix niger*	Schedule I
10	Indian Cobra	*Naja Naja*	Schedule II
11	Russell's Viper	*Vipera russelii*	Schedule II
12	Common Indian Krait	*Bungarus caeruleus*	Schedule II
13	Indian Monitor Lizard	*Varanus griseus*	Schedule I
14	Common Rat Snake	*ptyasmucosus*	Schedule II
15	Python	*Genus Python*	Schedule I

LEOPARD ,Scientific name: **Panthera Pardus**
Type: **Mammal, Diet: Carnivore**

Habitat:-Leopards are extremely adaptable and will tolerate a wide variety of habitats, but seem to prefer areas with rocky outcrops, mountains and forests. They even occur adjacent to areas of dense human habitation. Leopards have been seen drinking out of urban swimming pools and eating out of dog bowls in people's gardens.

Food: *- They can eat any animal that can be over powered by them. Leopards are strong swimmers and very much at home in the water, where they sometimes eat fish or crabs.*

Leopards are extremely adaptable and will tolerate a wide variety of habitats, but seem to prefer areas with rocky outcrops, mountains and forests. They even occur adjacent to areas of dense human habitation. Leopards have been spotted drinking water out of urban swimming pools and eating out of dog bowls in people's

gardens.

Selection of the potential habitats for leopard in study area was done on the basis of direct and indirect evidence of leopard, co-predators, prey and biotic pressure recorded. Almost the entire landscape has large mammals, including common leopard, but the densities may vary depending on the quality of habitat. Leopard is threatened by grazing (leads to competition between wild and domestic ungulates), conflicts relating to crop and livestock depredation, and some levels of poaching of leopard, co-predators and prey species.

Based on the observation of the overall occurrence of wildlife and its habitat in the surveyed areas, the following measures are suggested to improve leopard conservation efforts:

1. Research and monitoring of wildlife:
2. Mitigating leopard– human conflicts:
3. Livestock grazing and its impact on local vegetation and wildlife:
4. Well-planned development:
5. Infra-structure and Capacity building of field staff:

Jackals

Jackals are medium-sized omnivorous mammals of the genus Canis, which also includes wolves, coyotes and the domestic dog. While the word "jackal" has historically been used for many small canids.
Jackals and coyotes are opportunistic omnivores, predators of small to medium-sized animals and proficient scavengers. Their long legs and curved canine teeth are adapted for hunting small mammals, birds, and reptiles, and their large feet and fused leg bones give them a physique well-suited for long-distance running, capable of maintaining speeds of 16 km/h (9.9 mph) for extended periods of time. Jackals are crepuscular, most active at dawn and dusk.
Their most common social unit is a monogamous pair, which defends its territory from other pairs by vigorously chasing intruding rivals and marking landmarks around the territory with their urine and feces. The territory may be large enough to hold some young adults, which stay with their parents until they establish their own territories. Jackals may occasionally assemble in small packs, for example, to scavenge a carcass, but they normally hunt either alone or in pairs.

Jungle Cat

The **jungle cat** (*Felis chaus*), also called **reed cat** and **swamp cat**, is a medium-sized cat . It is listed as Least Concern on the IUCN Red List, and is mainly threatened by destruction of wetlands, trapping and poisoning.

The jungle cat has a uniformly sandy, reddish-brown or grey fur without spots; melanistic and albino individuals are also known. It is solitary in nature, except during the mating season and mother-kitten families. Adults maintain territories by urine spraying and scent marking. Its preferred prey is small mammals and birds. It hunts by stalking its prey, followed by a sprint or a leap; the ears help in pinpointing the location of prey. Both sexes become sexually mature by the time they are one year old; females enter oestrus from January to March. Mating behaviour is similar to that in the domestic cat: the male pursues the female in oestrus, seizes her by the nape of her neck and mounts her. Gestation lasts nearly two months. Births take place between December and June, though this might vary geographically. Kittens begin to catch their own prey at around six months and leave the mother after eight or nine months.

Ecology and behaviour

The jungle cat is typically diurnal and hunts throughout the day. Its activity tends to decrease during the hot noon hours. It rests in burrows, grass thickets and scrubs. It often sunbathes on winter days. Jungle cats have been estimated to walk 3–6 kilometres (1.9–3.7 mi) at night, although this likely varies depending on the availability of prey. The behaviour of the jungle cat has not been extensively studied. Solitary in nature, it does not associate with conspecifics, except in the mating season. The only prominent interaction is the mother-kitten bond. Territories are maintained by urine spraying and scent marking; some males have been observed rubbing their cheeks on objects to mark them.

Bears, crocodiles, golden jackals, leopards and snakes are the main predators of the jungle cat.[The golden jackal, particularly, can be a major competitor to the cat. When it encounters a threat, the jungle cat will vocalise before engaging in attack, producing sounds like small roars – a behavior uncommon for the other members of Felis. The meow of the jungle cat is also somewhat lower than that of a typical domestic cat. The jungle cat can host parasites such as Haemaphysalis ticks and Heterophyes trematode species.

Diet and hunting

Primarily a carnivore, the jungle cat prefers small mammals such as gerbils, hares and rodents. It also hunts birds, fish, frogs, insects and small snakes. Its prey typically weighs less than 1 kg (2.2 lb), and occasionally includes mammals as large as young gazelles. The jungle cat is unusual in that it is partially omnivorous: it eats

fruits, especially in winter. In a study carried out in Sariska Tiger Reserve, rodents were found to comprise as much as 95% of its diet.

The jungle cat hunts by stalking its prey, followed by a sprint or a leap; the sharp ears help in pinpointing the location of prey. It uses different techniques to secure prey. The cat has been observed searching for musk rats in their holes. Like the caracal, the jungle cat can perform one or two high leaps into the air to grab birds. It is an efficient climber as well. The jungle cat has been clocked at 32 km/h (20 mph). It is an efficient swimmer, and can swim up to 1.5 km (0.93 mi) in water and plunge into water to catch fish. Generation length of the jungle cat is 5.2 years.

Threats

Major threats to the jungle cat include habitat loss such as the destruction of wetlands, dam construction, environmental pollution, industrialization and urbanization. Illegal hunting is a threat.

Indian grey mongoose

The Indian grey mongoose has tawny grey or iron grey fur, which is more grizzled and stiffer and coarser than that of other mongooses. The ruddiness of the coat varies in different subspecies, but it is described as appearing more grey than other mongooses. The grizzled appearance comes from the individual hairs being ringed by creamy-white and black. The legs are brown and darker than the body. The hair around the muzzle and eyes is also brown but with a stronger rusty red colouring. The tail is bushy, whilst the tip of the tail, if coloured, is pale yellow or white. Their tail length equals their body length. Body length: 36–45 cm (14-17 inches) Tail length: 45 cm (17 inches), weight: 0.9-1.7 kg (2-4 lb). Males are significantly larger than the females. Indian grey mongooses are unusual in that they can discriminate four colours, more than most other mammals.

Ecology and behaviour

The Indian grey mongoose is omnivorous, though most of its diet is made up from live prey it catches from being an opportunistic hunter, with mice, rats, lizards, snakes, and beetles making up the bulk. Also eaten are ground birds, their eggs, grasshoppers, scorpions, centipedes, frogs, crabs, fish, and parts of plants: fruits, berries, and roots, as well as larger prey including hares and egrets. It kills prey by delivering a bite to the neck or head.

This species is known for its ability to combat venomous snakes. It primarily achieves this through tiring the snake out, by enticing it to make multiple strikes which it acrobatically avoids. Secondary protection against the venomous bite includes the stiff rigid hair, which is excited at such times, the thick loose skin and specialised acetylcholine receptors render it resistant or immune to snake

venom.[When dealing with scorpions, no measures are taken to disable the sting, and they are picked up in any manner.

The Indian grey mongoose mates between March and October, it breeding two to three times each year. The gestation period lasts for 60 to 65 days, the female gives birth to two to four offspring. The lifespan of the Indian grey mongoose is seven years in the wild, or 12 years, when in captivity.

Langoor

Gray langurs, sacred langurs, Indian langurs or Hanuman langurs are a group of Old World monkeys native to the Indian subcontinent constituting the entirety of the genus Semnopithecus. Most taxa have traditionally been placed in the single species Semnopithecus entellus. A taxonomic classification with fewer species has also been proposed. Genetic evidence suggests that the Nilgiri langur and purple-faced langur, which usually are placed in the genus Trachypithecus, actually belong in Semnopithecus.

Gray langurs are fairly terrestrial, inhabiting forest, open lightly wooded habitats, and urban areas on the Indian subcontinent. Most species are found at low to moderate altitudes.

Characteristics

These langurs are largely gray (some more yellowish), with a black face and ears. Externally, the various species mainly differ in the darkness of the hands and feet, the overall color and the presence or absence of a crest. Typically all north Indian gray langurs have their tail tips looping towards their head during a casual walk whereas all south Indian and Sri Lankan gray langurs have an inverted "U" shape or a "S" tail carriage pattern. There are also significant variations in the size depending on the sex, with the male always larger than the female. The head-and-body length is from 51 to 79 cm (20 to 31 in). Their tails, at 69 to 102 cm (27 to 40 in) are never longer than their bodies. Langurs from the southern part of their range are smaller than those from the north. The average weight of gray langurs is 18 kg (40 lb) in the males and 11 kg (24 lb) in the females.

Langurs mostly walk quadrupedally and spend half their time on the ground and the other half in the trees. They will also make bipedal hops, climbing and descending supports with the body upright, and leaps. Langurs can leap 3.6–4.7 m (12–15 ft) horizontally and 10.7–12.2 m (35–40 ft) in descending.

Distribution and habitat

Gray langurs can adapt to a variety of habitats. They inhabit arid habitats like deserts, tropical habitats like tropical rainforests and temperate habitats like coniferous forests, deciduous habitats and mountains habitats. They are found at sea level to altitudes up to 4,000 m (13,000 ft). They can adapt well to human settlements, and are found in villages, towns and areas with housing or agriculture.

Ecology and behavior

Gray langurs are diurnal. They sleep during the night in trees but also on man-made structures like towers and electric poles when in human settlements. When resting in trees, they generally prefer the highest branches.

Ungulates like bovine and deer will eat food dropped by foraging langurs. Langurs are preyed upon by leopards, dholes and tigers. Wolves, jackals, Asian black bears and pythons may also prey on langurs.

Diet

Gray langurs are primarily herbivores. However, unlike some other colobines they do not depend on leaves and leaf buds of herbs, but will also eat coniferous needles and cones, fruits and fruit buds, evergreen petioles, shoots and roots, seeds, grass, bamboo, fern rhizomes, mosses, and lichens. Leaves of trees and shrubs rank at the top of preferred food, followed by herbs and grasses. Non-plant materials consumed include spider webs, termite mounds and insect larvae. They forage on agricultural crops and other human foods, and even accept handouts. Although they occasionally drink, langurs get most of their water from the moisture in their food.

Status and conservation

Gray langurs have stable populations in some areas and declining ones in others. Both the black-footed gray langur and Kashmir gray langur are considered threatened. The latter is the rarest species of gray langur, with less than 250 mature individuals remaining.

In India, gray langurs number at around 300,000. India has laws prohibiting the capturing or killing of langurs, but they are still hunted in some parts of the country. Enforcement of these laws has proven to be difficult and it seems most people are unaware of their protection. Populations are also threatened by mining, forest fires and deforestation for wood.

Langurs can be found near roads and can become victims of automobile accidents. Langurs are considered sacred in the Hindu religion and are sometimes kept for religious purposes by Hindu priests and for roadside performances. However, some religious groups use langurs as food and medicine, and parts of gray langurs are sometimes kept as amulets for good luck.

Because of their sacred status and their less aggressive behavior compared to other primates, langurs are generally not considered pests in many parts of India. Nevertheless, secularization seems to have somewhat changed such attitudes. Langurs will raid crops and steal food from houses, and this causes people to persecute them. While people may feed them in temples, they do not extend such care to monkeys at their homes. Langurs stealing and biting people to get food in urban areas may also contribute to more persecutions.

Common Monkey

Monkey is a common name that may refer to groups or species of mammals. Many monkey species are tree-dwelling (arboreal), although there are species that live primarily on the ground, such as baboons. Most species are also active during the day (diurnal). Monkeys are generally considered to be intelligent, especially the old world monkeys of Catarrhini.

Monkeys, including apes, can be distinguished from other primates by having only two pectoral nipples, a pendulous penis, and a lack of sensory whiskers.

Relationship with humans

The many species of monkey have varied relationships with humans. Some are kept as pets, others used as model organisms in laboratories or in space missions. They may be killed in monkey drives (when they threaten agriculture) or used as service animals for the disabled.

In some areas, some species of monkey are considered agricultural pests, and can cause extensive damage to commercial and subsistence crops. This can have important implications for the conservation of endangered species, which may be subject to persecution. In some instances farmers' perceptions of the damage may exceed the actual damage. Monkeys that have become habituated to human presence in tourist locations may also be considered pests, attacking tourists.In religion and popular culture, monkeys are a symbol of playfulness, mischief and fun.

Civet Cats (Viverridae family):-

Indian Peafowl (*Pavo cristatus*)

Peafowl are native to southern India and Ceylon. The Indian Peafowl or Blue Peafowl (Pavo cristatus) is a large and brightly colored bird of the pheasant family native to South Asia, but introduced and semi-feral in many other parts of the world. They are found mainly on the ground in open forest or cultivation where they forage for berries, grains but will also prey on snakes, lizards, and small rodents. Their loud calls make them easy to detect, and in forest areas, often indicate the presence of a predator such as a tiger. They forage on the ground, moving in small groups and will usually try to escape on foot through undergrowth and avoid flying. They will fly up into tall trees to roost, however. It is the National Bird of India.

Geographical Distribution:-

The Indian sub –continent is the natural range of the Indian Peafowl .It is found in good numbers in Indian Territory ranging from outer Himalayas through vast stretch of the country including the peninsula .It is also found in Pakistan, Nepal and Sri Lanka. The arid deserts of Rajasthan, the river banks of Gujarat and M.P, the foothills of the Himalayas in U.P and the forests of Haryana – these are considered

to be the major and commonly known habitats of peacocks in India.

Reproduction and growth:-

In the wild, peafowl live in parties, usually dry open forest. They habitually go to roost early in tall trees, calling and bugling loudly as they move upward. The long ornamental feathers, which the peacock displays so magnificently before the peahen in courtship, are not its true tail feathers but are elongated feathers of the upper tail coverts. In spite of its dimensions, the train does not hinder the bird either when perching or in flight. In the courtship display, the huge tail coverts are elevated to form a massive, lacy fan, supported from behind by the unadorned tail feathers. The train extends from ground to ground over the back and is angled over the head like a tilted umbrella thickly hung with glittering ornaments. This sight is accompanied by rasping noises from the fluttered wings and prancing movements of the feet. The male has a harem of two to five females. The peahen lays from three to five brownish buff eggs.

Diet:-

Peafowl are omnivorous and eat seeds, insects, fruits, small mammals and reptiles. They feed on small snakes but keep their distance from larger ones. The large percent of their food is made up of the fallen berries of *Zizyphus*. Around cultivated areas, peafowl feed on a wide range of crops such as groundnut, tomato, paddy, chilly and even bananas. Around human habitations, they feed on a variety of food scraps and even human excreta.

Life:-

Birds have been known to live for 23 years but it is estimated that they live for only about 15 years.

Behavior:-

In its homeland, India, where it may still be found wild in the jungles, the peacock is both popular and useful in that it feeds on young cobras. It utters an pleasant wailing cry, especially before a rainfall. Peafowl are quarrelsome and do not mix well with other domestic animals.

Illegal poaching for meat however continues and declines have been noted in parts of India & outside India eating peacock is legal. Poaching of peacocks for their meat and feathers; and accidental poisoning by feeding on pesticide treated seeds are known threats to wild birds. Methods to identify if feathers have been plucked or have been shed naturally have been developed as Indian law allows the collection of feathers that have been shed. In parts of India, the birds can be a nuisance to agriculture as they damage crops. It's adverse effects on crops, however, seem to be offset by the beneficial role it plays by consuming prodigious

quantities of pests such as grasshoppers. They can also be a problem in gardens and homes where they damage plants, attack their reflections breaking glass and mirrors, perch and scratch cars or leave their droppings. Many cities where they have been introduced and gone feral have peafowl management programs. These include educating citizens on how to prevent the birds from causing damage while treating the birds humanely.

Threat :-

These birds are under continuous treat from man beings for variety of reasons like demand for feather and meat ,direct encounter with the farmers during harvesting seasons , adverse impact due to use of increase and habitat reduction due to conservation of their habitat to agricultural land, mining growth etc.

Conservation plan:-

- To provide drinking water and feeding materials for their survival.
- Awareness programs will be conducted among villagers and to stop poaching.
- The prolific use of insecticides will be checked as these harmful chemicals are detrimental and instrumental for killing of insects which are natural prey for the birds.

Black partridge

The black francolin (Francolinus francolinus) is a gamebird in the pheasant family Phasianidae of the order Galliformes, gallinaceous birds. It was formerly known as the Black Partridge. It is the state bird of Haryana state, India

Identification

The head of the black francolin is curved with brown iris eyes color and unique pattern of brown color crown and the throat color is black. It has a length range of 33 to 36 cm and weight approximate about 453 g (16 oz) and the size of black francolin is 9 to 16 inches. The primary color is black with black breast rufous belly, white spots on flanks and golden brown spots at the back of body. The flight pattern of black francolin is short, direct flight punctuated by glides with rounded wings, rounded tail narrow black and white bars.

Black francolin male

The male black francolin is black with white patch on the cheek, a chestnut collar and white spots on the flanks. The back and wings are scalloped with shades of golden brown with sub-terminal tawny-buff bands and pale edges. Tail is black with narrow white or greyish bars. Legs are reddish-brown to red.

Black francolin female

The female is mainly brown, but has a chestnut hind neck. The extent of the white spotting on the flanks varies substantially across the species' range and the depth of colour of the females similarly varies. The female has the upper plumage, wings and tail as in the male but the black is replaced by mottled brown and the brown bars on the lower back and tail are wider. Female is similar but dull with no cheek patch, and collar is replaced with a nuchal patch. Head and under parts are buff where the male shows black. Rump and upper tail coverts light brown.

Black Francoline Female

Habitat

Black francolins appear to be found in scrubby habitats with plenty of cultivated crops tall enough to offer shelter and open beneath to provide escape routes and easy travel. They prefer the areas of thick vegetation, usually near water. They are not forest birds but will frequent brush land and wood edges associated with grass land. They appear to be more closely associated to water than chukars are, and in drier areas.

Breeding and nesting

Francolins normally nests in a tall grasslands from late March to May. The male may be seen standing on a rock or low tree attracting attention with its extraordinary creaking call. It may be heard all day long in April, during nesting, and less persistently in March and May as well as the summer months. Both parents tend chicks after hatching. Young stay with parents through their first winter. The most likely breeding locations Savanna, Grasslands, Scrub vegetation areas under the cultivated crops. They have a loud call during the breeding season. Males may also become aggressive during the breeding season, make sure there is plenty of cover and escape routes for the hen and it may be necessary to house her separate and allow limited access for breeding only. They are generally monogamous in the wild and it is best to house only pair per aviary. Well planted

aviaries with little surrounding traffic would be best for breeding. They are fairly winter hardy, but always provide some shelter during the coldest months breeds from late March to September depending on the range.

The normal Clutch size between 10 and 14 eggs and only the hen incubates the eggs, the incubation period is 18 to 19 days and the breeding season is April to June and the young ones will appear in April through October.
Forages (plant, leaves, and stem) on the ground and eats a wide variety of seeds and insects. May also eat small mealworms and wax worms, but be careful when feeding to chicks as they are prone to toe-picking. Food consists mainly of grain, grass seeds, fallen berries, shoots, tubers, termites, ants and insects.
The color of the egg is white-spotted olive or pale brown.
Black francolins are monogamous.

Indian Cobra (Naja Naja)

The Indian cobra (Naja naja) also known as the spectacled cobra, Asian cobra, or binocellate cobra is a species of the genus Naja found in India and a member of the "big four" species that inflict the most snakebites on humans in India. It is distinct from the king cobra which belongs to the monotypic genus Ophiophagus. The Indian cobra is revered in Indian mythology and culture, and is often seen with snake charmers. It is now protected in India under the Indian Wildlife Protection Act (1972).

Description

Spectacle pattern on a snake's hood.

The Indian cobra varies tremendously in colour and pattern throughout its range. The ventral scales or the underside colouration of this species can be grey, yellow, tan, brown, reddish or black. Dorsal scales of the Indian cobra may have a hood mark or colour patterns. The most common visible pattern is a posteriorly convex light band at the level of the 20th to 25th ventrals. Salt-and-pepper speckles,

especially in adult specimens, are seen on the dorsal scales. Specimens, particularly those found in Sri Lanka may exhibit poorly defined banding on the dorsum. Ontogenetic colour change is frequently observed in specimens in the north-western parts of their geographic range (southern Pakistan and north-western India). In southern Pakistan, juvenile specimens may be grey in colour and may or may not have a hood mark. Adults on the other hand are typically uniformly black in colour on top (melanistic), while the underside, outside the throat region, is usually light. Patterns on the throat and ventral scales are also variable in this species. The majority of specimens exhibit a light throat area followed by dark banding, which can be 4–7 ventral scales wide. Adult specimens also often exhibit a significant amount of mottling on the throat and on the venter, which makes patterns on this species less clear relative to patterns seen in other species of cobra. With the exception of specimens from the north-west, there is often a pair of lateral spots on the throat where the ventral and dorsal scales meet. The positioning of these spots varies, with north-western specimens having the spots positioned more anterior, while specimens from elsewhere in their range are more posterior. Many specimens exhibit a hood mark. This hood mark is located at the rear of the Indian cobra's hood. When the hood mark is present, are two circular ocelli patterns connected by a curved line, evoking the image of spectacles
The Indian cobra is a moderately sized, heavy bodied species. This cobra species can easily be identified by its relatively large and quite impressive hood, which it expands when threatened. This species has a head which is elliptical, depressed, and very slightly distinct from neck. The snout is short and rounded with large nostrils. The eyes are medium in size and the pupils are round. The majority of adult specimens range from 1 to 1.5 metres (3.3 to 4.9 ft) in length.

Scalation

Dorsal scales are smooth and strongly oblique. Midbody scales are in 23 rows (21–25), with 171–197 ventrals. There are 48–75 divided subcaudals and the anal shield is single. There are 7 upper labials (3rd the largest and in contact with nasal anteriorly, 3rd and 4th in contact with eye) and 9-10 lower labials (small angular cuneate scale present between 4th and 5th lower labial), as well as 1 preocular in contact with internasals, and 3 postoculars. Temporals are 2 + 3.
The Indian Cobra inhabits a wide range of habitats throughout its geographical range. It can be found in dense or open forests, plains, agricultural lands (rice paddy fields, wheat crops), rocky terrain, wetlands, and it can even be found in heavily populated urban areas such as villages and city outskirts, ranging from sea-level to 2,000 metres (6,600 ft) in altitude. This species is absent from true desert regions. The Indian cobra is often found in the vicinity of water. Preferred hiding locations are holes in embankments, tree hollows, termite mounds, rock piles and small mammal dens.

Venom

The Indian cobra's venom mainly contains a powerful post-synaptic neurotoxin and cardiotoxin. The venom acts on the synaptic gaps of the nerves, thereby paralyzing muscles, and in severe bites leading to respiratory failure or cardiac arrest. The venom components include enzymes such as hyaluronidase that cause lysis and increase the spread of the venom. Envenomation symptoms may manifest between 15 minutes and 2 hours following the bite.

In mice, the SC LD50 range for this species is 0.45 mg/kg – 0.75 mg/kg. The average venom yield per bite is between 169 and 250 mg. Though it is responsible for many bites, only a small percentage are fatal if proper medical treatment and anti-venom are given. Mortality rate for untreated bite victims can vary from case to case, depending upon the quantity of venom delivered by the individual involved. According to one study, it is approximately 20–30%. but in another study involving victims who were given prompt medical treatment, the mortality rate was only 9%. The venom of young cobras has been used as a substance of abuse in India, with cases of snake charmers being paid for providing bites from their snakes.

Russell's viper (Vipera russelii)

Daboia russelii is a species of venomous snake in the family Viperidae of venomous Old World vipers. The single member species, D. russelii, is found in Asia throughout the Indian subcontinent. Apart from being a member of the big four snakes in India, Daboia is also one of the genera responsible for causing the most snakebite incidents and deaths among all venomous snakes on account of many factors, such as their wide distribution, generally aggressive demeanor, and frequent occurrence in highly populated areas.]

Russelii can grow to a maximum length (body + tail) of 166 cm (5.5 ft) and averages about 120 cm (4 ft) on mainland Asian populations. Island populations may be slightly smaller on average. It is more slender than most vipers. Ditmars (1937) reported the following dimensions for a "fair-sized adult specimen":

Total length	4 ft., 1 inch	124 cm
Length of tail	7 inches	18 cm
Girth	6 inches	15 cm
Width of head	2 inches	5 cm
Length of head	2 inches	5 cm

The head is flattened, triangular, and distinct from the neck. The snout is blunt, rounded, and raised. The nostrils are large, each in the middle of a large, single nasal scale. The lower edge of the nasal scale touches the nasorostral scale. The supranasal scale has a strong crescent shape and separates the nasal from the nasorostral scale anteriorly. The rostral scale is as broad as it is high.

Head of the Russell's viper

The crown of the head is covered with irregular, strongly fragmented scales. The supraocular scales are narrow, single, and separated by six to nine scales across the head. The eyes are large, flecked with yellow or gold, and surrounded by 10–15 circumorbital scales. The snake has 10–12 supralabials, the fourth and fifth of which are significantly larger. The eye is separated from the supralabials by three or four rows of suboculars. Of the two pairs of chin shields, the front pair is notably enlarged. The two maxillary bones support at least two and at the most five or six pairs of fangs at a time: the first are active and the rest replacements.[6] The fangs attain a length of 16.5 mm (0.65 in) in the average specimen.

The body is stout, the cross-section of which is rounded to circular. The dorsal scales are strongly keeled; only the lowest row is smooth. Mid-body, the dorsal scales number 27–33. The ventral scales number 153–180. The anal plate is not divided. The tail is short — about 14% of the total length — with the paired subcaudals numbering 41–68.

Dorsally, the color pattern consists of a deep yellow, tan, or brown ground color, with three series of dark brown spots that run the length of the body. Each of these spots has a black ring around it, the outer border of which is intensified with a rim of white or yellow. The dorsal spots, which usually number 23–30, may grow together, while the side spots may break apart. The head has a pair of distinct dark patches, one on each temple, together with a pinkish, salmon, or brownish V or X marking that forms an apex towards the snout. Behind the eye is a dark streak, outlined in white, pink, or buff. The venter is white, whitish, yellowish, or pinkish, often with an irregular scattering of dark spots.

Habitat

D. russelii is not restricted to any particular habitat, but does tend to avoid dense forests. The snake is mostly found in open, grassy or bushy areas, but may also be found in second growth forests (scrub jungles), on forested plantations and farmland. It is most common in plains, coastal lowlands, and hills of suitable habitat. Generally, it is not found at altitude, but has been reported as far up as 2300–3000 m (7,500-9,800 ft). Humid environments, such as marshes, swamps, and rain forests, are avoided.

This species is often found in highly urbanized areas and settlements in the countryside, the attraction being the rodentscommensal with man.[10] As a result, those working outside in these areas are most at risk of being bitten. D. russelii does not associate as closely with human habitation as Naja and Bungarus species (cobras and kraits).

Behaviour

D. russelii is terrestrial and active primarily as a nocturnal forager. However, during cool weather, it alters its behavior and becomes more active during the day.

Adults are reported to be slow and sluggish unless pushed beyond a certain limit, after which they can become very aggressive. Juveniles, though, are generally more nervous.

When threatened, they form a series of S-loops, raise the first third of the body, and produce a hiss that is supposedly louder than that of any other snake. When striking from this position, they can exert so much force that even a large individual can lift most of its body off the ground in the process. These snakes are strong and may react violently to being picked up.[5] The bite may be a snap, or they may hang on for many seconds.

Although this genus does not have the heat-sensitive pit organs common to the Crotalinae, it is one of a number of viperines that are apparently able to react to thermal cues, further supporting the notion that they, too, possess a heat-sensitive organ. The identity of this sensor is not certain, but the nerve endings in the supranasal sac of these snakes resemble those found in other heat-sensitive organs.

Reproduction

D. russelii is ovoviparous. Mating generally occurs early in the year, although pregnant females may be found at any time. The gestation period is more than six months. Young are produced from May to November, but mostly in June and July. It is a prolific breeder. Litters of 20–40 are common, although fewer offspring may occur, as few as one. The reported maximum is 75 in a single litter. At birth, juveniles are 215–260 mm (8.5–10.2 in) in total length. The minimum total length for a gravid female is about 100 cm (39 in). It seems that sexual maturity is

achieved in 2–3 years. In one case, it took a specimen nearly 4.5 hours to give birth to 11 young.

D. russelii feeds primarily on rodents, although especially it will also eat small reptiles, land crabs, scorpions, and other arthropods. Juveniles are crepuscular, feeding on lizards and foraging actively. As they grow and become adults, they begin to specialize in rodents. Indeed, the presence of rodents and lizards is the main reason they are attracted to human habitation.

Venom

The quantity of venom produced by individual specimens of *D. russelii* is considerable. Reported venom yields for adult specimens range from 130–250 mg to 150–250 mg to 21–268 mg. For 13 juveniles with an average total length of 79 cm (31 in), the average venom yield was 8–79 mg (mean 45 mg).

The LD50 in mice, which is used as a possible indicator of snake venom toxicity, is: 0.133 mg/kg intravenous, 0.40 mg/kg intraperitoneal,[24] about 0.75 mg/kg subcutaneous. For most humans, a lethal dose is about 40–70 mg. In general, the toxicity depends on a combination of five different venom fractions, each of which is less toxic when tested separately. Venom toxicity and bite symptoms in humans vary within different populations and over time.

Envenomation symptoms begin with pain at the site of the bite, immediately followed by swelling of the affected extremity. Bleeding is a common symptom, especially from the gums and in the urine, and sputum may show signs of blood within 20 minutes after the bite. The blood pressure drops, and the heart rate falls. Blistering occurs at the site of the bite, developing along the affected limb in severe cases. Necrosis is usually superficial and limited to the muscles near the bite, but may be severe in extreme cases. Vomiting and facial swelling occur in about one-third of all cases. Kidney failure (renal failure) also occurs in approximately 25-30 percent of untreated bites. Severe disseminated intravascular coagulation also can occur in severe envenomations. Early medical treatment and early access to antivenom can prevent and drastically reduce the chance of developing the severe/potentially lethal complications.

Severe pain may last for 2–4 weeks. Locally, it may persist depending on the level of tissue damage. Often, local swelling peaks within 48–72 hours, involving both the affected limb and the trunk. If swelling up to the trunk occurs within 1–2 hours, massive envenomation is likely. Discoloration may occur throughout the swollen area as red blood cells and plasma leak into muscle tissue. Death from septicaemia or kidney, respiratory, or cardiac failure may occur 1 to 14 days after the bite or even later.

Common Indian krait

(*Bungarus caeruleus*), also known as Indian krait or blue krait) is a species of venomous snake of the genus Bungarus found in the jungles of the Indian subcontinent. It is a member of the "big four" species, inflicting the most snakebites on humans in India.

The average length is 0.9 m (3.0 ft), but they can grow to 1.75 m (5 ft 9 in). Males are longer, with proportionately longer tails. The head is flat and the neck hardly evident. The body is cylindrical, tapering towards the tail. The tail is short and rounded. The eyes are rather small, with rounded pupils, indistinguishable in life. The head shields are normal, with no loreals; four shields occur along the margin of the lower lip; the third and fourth supraoculars touch the eye. The scales are highly polished, in 15-17 rows; the vertebral row is distinctly enlarged and hexagonal. Ventrals number 185-225 and caudals 37-50, entire.

Colouration is generally black or bluish black, with about 40 thin, white crossbars which may be indistinct or absent anteriorly. The pattern, however, is complete and well defined in the young, which are marked with conspicuous crossbars even anteriorly; in old individuals, the narrow white lines may be found as a series of connected spots, with a prominent spot on the vertebral region. A white preocular spot may be present; the upper lips and the belly are white.

Distribution and habitat

This species is found in Peninsular India from Sindh (Pakistan), to the West Bengal plains. It occurs throughout South India at elevations up to about 1600 m.

Its range comprises a wide variety of habitats. It is found in fields and low scrub jungle, as well as inhabited areas. It is known to take up residence in termite mounds, brick piles, rat holes, even inside houses. It is frequently found in water or in proximity to a water source.

Feeding

The common krait feeds primarily on other snakes, including: "blind worms" (snakes of the genus Typhlops); and cannibalizes on other kraits, including the young. It also feeds on small mammals (such as rats, and mice), lizards and frogs. The young are known to eat arthropods.

Common krait (*Bungarus caeruleus*) eating a wolf snake (*Lycodon aulicus*)

Behavior

Behavioral differences during day and night time have been reported in *B. caeruleus*. During the day, it is sluggish and generally docile. It often hides in rodent holes, loose soil, or beneath debris, so is rarely seen. It often rolls its body into a loose, coiled ball, keeping its head well concealed. When in this 'balled' condition, the snake allows considerable handling, but overhandling often instigates bites.

However, at night, the snake is very active and escapes by hissing loudly, or keeping still, occasionally biting the source of the annoyance.

When agitated, it will coil up with its head concealed and body flattened, and makes jerky movements. It may also lift its tail. It is reluctant to bite, but when it does, it typically holds on for a while, which enables it to inject considerable amounts of venom. It may become aggressive at night if threatened since this is its active time.

Venom

The common krait's venom consists mostly of powerful neurotoxins, which induce muscle paralysis. Clinically, its venom contains presynaptic and postsynaptic neurotoxins,[1] which generally affect the synaptic cleft (the points of information-transfer between neurons).

In mice, the LD50 values of its venom are 0.325 mg/kg SC, 0.169 mg/kg IV and 0.089 mg/kg IP. and the average venom yield is 10 mg (dry weight).

Kraits are nocturnal, so seldom encounter humans during daylight hours; incidents occur mainly at night. Frequently, little or no pain occurs from a krait bite, and this can provide false reassurance to the victim. Typically, victims complain of severe abdominal cramps, accompanied by progressive paralysis. If death occurs, it takes place about four to eight hours after the krait bite. Cause of death is general respiratory failure, i.e. suffocation.

Indian Monitor lizards (*Varanus bengalensis)*

The Bengal monitor or common Indian monitor, is a monitor lizard found widely distributed over the Indian Subcontinent, as well as parts of Southeast Asia and West Asia. This large lizard is mainly terrestrial, and grows to about 175 cm from the tip of the snout to the end of the tail. Young monitors may be more arboreal, but adults mainly hunt on the ground, preying mainly onarthropods, but also taking small terrestrial vertebrates, ground birds, eggs and fish. Although large monitors have few predators apart from humans who hunt them for meat, younger individuals are hunted by many predators. They do not possess any venom glands or delivery mechanisms but folk myths around India hold these lizards as venomous.

Their mandibular glands produce secretions at the base of the teeth, and although some varanids have been shown to have a venom, no toxicity has been reported in the Bengal monitor. The species is distributed mainly in the lower elevations, and is found both in dry semiarid desert habitats to moist forest. They are often found in agricultural areas, and are mainly found below 1500m altitude.

Captives have been known to live for nearly 22 years. Predators of adults include pythons,

Mammalian predators and birds. A number of ectoparasites and endoparasites are recorded.

They are capable of rapid movement on the ground. Small individuals may climb trees to escape, but larger ones prefer to escape on the ground. They can climb well. On the ground, they sometimes stand on the hind legs to get a better view or when males fight other males. They can also swim well and can stay submerged for at least 17 minutes.

Large adults may ascend vertical tree trunks, where they sometimes stalk and capture roosting bats. Their normal prey consists of beetles, grubs, orthopterans, scorpions, snails, ants and other invertebrates. Vertebrate prey is comparatively rare, and includes frogs, fish, lizards, snakes and rodents. They sometimes feed on dead animals. In areas where livestock are common, they often visit dung, where they forage for beetles and other insects

They are usually shy and avoid humans. They have keen eyesight and can detect human movement nearly 250 m away. When caught, a few individuals may bite, but rarely do so. The lizard is known as bis-cobra in western India, Goyra in Rajasthan, guishaap or goshaap in West Bengal and goh in Punjab and Bihar, as ghorpad in Maharashtra.

Medicinal

Monitor lizard meat, particularly the tongue and liver, is eaten in parts of India.In parts southern India, different parts of monitor lizards are used for a variety of medical purposes. The flesh is eaten for the relief of rheumatic pain, abdominal fat

is used as a salve for skin infections, oil and fat are used to treat hemorrhoids or chronic pain, and the oil is used as an aphrodisiac lubricant (*sande ka tel*).

Leather

"Large-scale exploitation" of monitor lizards is undertaken for their skins, which are described as being "of considerable utility" in the leather industry. monitor lizard leather is used for membranes in traditional drums (called kundu).

Food

The meat of monitor lizards is eaten by some tribes in India The meat of monitor lizards is used in Nepal for medicinal and food purpose.

Conservation status

According to IUCN Red List of threatened species, most of the monitor lizards species fall in the categories of least concern, but the population is decreasing globally. All but five species of monitor lizards are classified by the Convention on International Trade in Endangered Species of Wild Fauna and Flora under Appendix II, which is loosely defined as species that are not necessarily threatened with extinction, but may become so unless trade in such species is subject to strict regulation to avoid use incompatible with the survival of the species in the wild. The remaining five species – V. bengalensis, V. flavescens, V. griseus, V. komodoensis, and V. nebulosus – are classified under CITES Appendix I, which outlaws international commercial trade in the species.

Common Rat Snake

Ptyas mucosa, commonly known as the oriental rat snake, Indian rat snake, *dhaman*, is a common species of colubrid snake found in parts of South and Southeast Asia. Dhamans are large snakes. Typical mature total length is around 1.5 to 1.95 m (4 ft 11 in to 6 ft 5 in) though specimens exceeding 2 m (6 ft 7 in) are often not uncommon. The record sized length for this species was recorded as 3.7 m (12 ft 2 in), second in size perhaps only to their cousin Ptyas carinata among all known living colubrid snakes. Despite their large size, oriental ratsnakes are usually quite slender with even a specimen of 2 m (6 ft 7 in) commonly measuring 4 to 6 cm (1.6 to 2.4 in) only around in diameter. Furthermore, the average weight of ratsnakes caught in Java was around 877 to 940 g (1.933 to 2.072 lb), though larger males of over 2.3 m (7 ft 7 in) (which average mildly larger of the two sexes in the species) may easily weigh over 2.5 kg (5.5 lb). Their colour varies from pale browns in dry regions to nearly black in moist forest areas. Dhamans are diurnal, semi-arboreal, non-venomous, and fast-moving. Dhamans eat a variety of prey and are frequently found in urban areas where rodents thrive.

Dhamans, though harmless to humans, are fast-moving, excitable snakes. In captivity individuals remain highly territorial and may continue to defend their turf aggressively, attempting to startle or strike at passing objects. Dhamans are diurnal and semiarboreal. They inhabit forest floors, wetlands, rice paddies, farmland, and suburban areas where they prey upon small reptiles, amphibians, birds, and mammals. Adults, unusually for a colubrid, prefer to subdue their prey by sitting on it rather than by constricting, using body weight to weaken prey.

Dhamans mate in late spring and early summer, though in tropical areas reproduction may take place year round. Males establish boundaries of territory using a ritualised test of strength in which they intertwine their bodies. The behaviour is sometime misread by observers as a 'mating dance' between opposite-sex individuals.[11] Females produce 6-15 eggs per clutch several weeks after mating.

Indian Rat Snake

Rock python (*Python molurus)*

Python molurus is a large, nonvenomous python species native to tropical and subtropical regions of the Indian subcontinent and Southeast Asia. It is known by the common names Indian python, black-tailed python, and Indian rock python. It is generally lighter colored than the Burmese python and reaches usually 3 m (9.8 ft).

Description

The color pattern is whitish or yellowish with the blotched patterns varying from shades of tan to dark brown. This varies with terrain and habitat.

Distribution and habitat

The nominate subspecies occurring in India typically grows to 3 m (9.8 ft). This value is supported by a 1990 study in Keoladeo National Park, where 25% of the python population was 2.7–3.3 m (8.9–10.8 ft) long. he nominate subspecies occurs in India. They occur in a wide range of habitats, including grasslands,

swamps, marshes, rocky foothills, woodlands, "open" jungle, and river valleys. They depend on a permanent source of water. Sometimes, they can be found in abandoned mammal burrows, hollow trees, dense water reeds, and mangrove thickets.

Because of confusion with the Burmese python, exaggerations and stretched skins in the past, the maximum length of this subspecies is hard to tell. The longest scientifically recorded specimen was collected in Pakistan, was 4.6 m (15 ft) long and weighed 52 kg (110 lb). In Pakistan, Indian pythons commonly reach a length of 2.4–3.0 m (7.9–9.8 ft).

Behavior

Lethargic and slow moving even in their native habitat, they exhibit timidity and rarely try to attack even when attacked. Locomotion is usually with the body moving in a straight line, by "walking on its ribs". They are excellent swimmers and are quite at home in water. They can be wholly submerged in water for many minutes if necessary, but usually prefer to remain near the bank.

Feeding

Like all snakes, Indian pythons are strict carnivores and feed on mammals, birds, and reptiles indiscriminately, but seem to prefer mammals. Roused to activity on sighting prey, the snake advances with a quivering tail and lunges with an open mouth. Live prey is constricted and killed. One or two coils are used to hold it in a tight grip. The prey, unable to breathe, succumbs and is subsequently swallowed head first. After a heavy meal, they are disinclined to move. If forced to, hard parts of the meal may tear through the body. Therefore, if disturbed, some specimens disgorge their meal to escape from potential predators. After a heavy meal, an individual may fast for weeks, the longest recorded duration being 2 years. The python can swallow prey bigger than its diameter because the jaw bones are not connected. Moreover, prey cannot escape from its mouth because of the arrangement of the teeth.

Reproduction

Oviparous, up to 100 eggs are laid by the animal, which are protected and incubated by the female. Towards this end, they are capable of raising their body temperature above the ambient level through muscular contractions. The hatchlings are 45–60 cm (18–24 in) in length and grow quickly. An artificial incubation method using climate-controlled environmental chambers was developed in India for successfully raising hatchlings from abandoned or unattended eggs.

Conservation status

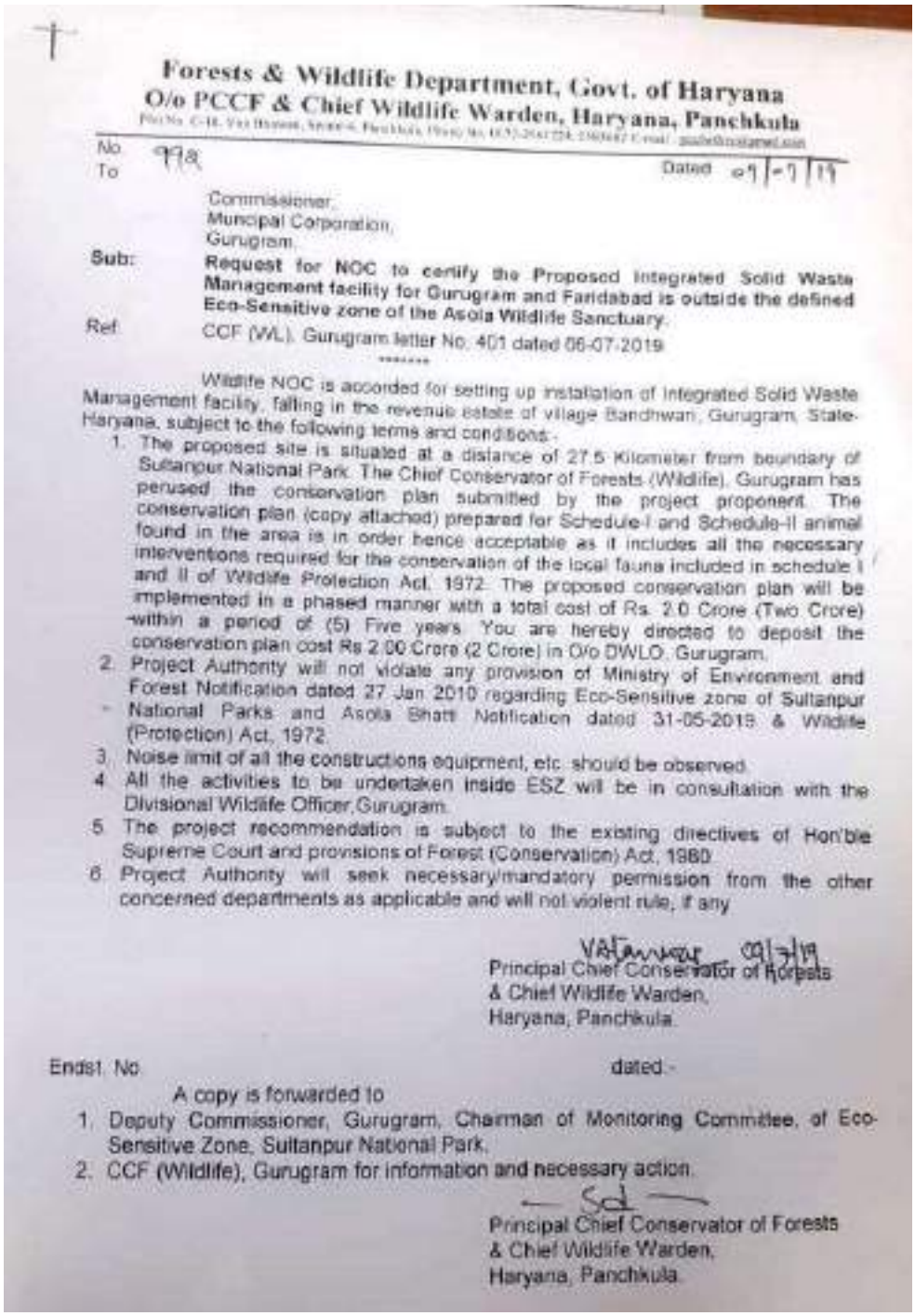
The Indian python is classified as lower risk/near threatened on the IUCN Red List of Threatened Species (v2.3, 1996). This listing indicates that it may become threatened with extinction and is in need of frequent reassessment.

Table 2: Budget for Flora & Fauna Management Plan

S.N.	Description	Amount in Crores (Rs.)
A]	**Capital cost**	
1	Green Shelter Belt - Air pollution Control	3.5
2	Avenue Plantation	
3	Plantation – waterlogged areas / Artificial Pond /lake	
4	Improvement in Food and Nesting Habitat	
5	Elevated earthen / Wooden platforms for the birds	
6	Artificial Nesting Platform	
B]	**Revenue expenditure for next 5 years**	
1	Green Shelter Belt - Air pollution Control	1.0
2	Avenue Plantation	
3	Plantation – waterlogged areas	
4	Improvement in Food and Nesting Habitat	
5	Elevated earthen / Wooden platforms for the birds	0.2
6	Artificial Nesting Platform	
7	Manpower assistance/ Monitoring cell/ Experts team	
	Grand total	4.7
	TOTAL CER @2% (6.7 CRORE OF PROECT COST 330.48 CR) FOR OTHER EMP ACTIVITIES	2.0

The above plan with budget was approved and NOC was obtained from the Principal Chief Conservator of Forest and Chief Wildlife Warden, Haryana vide letter no. 992 on dated: 09/07/19 certifying that the project is outside the defined Eco-sensitive zone of the Asola Bhatti Wildlife Sanctuary as per Notification dated: 31.05.2019.

The proposed conservation plan will be implemented complying the terms & conditions mention in the NOC given below. The above approved budget will be implemented in phase manner with total cost of 2.0 cr within a period of 5 years and the implemented plan will be deposited i.e 2.0 Cr in O/o. DWLO, Gurugram.



Forests & Wildlife Department, Govt. of Haryana
O/o PCCF & Chief Wildlife Warden, Haryana, Panchkula

No. 998
To

Dated 09-7-19

Commissioner,
Municipal Corporation,
Gurugram.

Sub: **Request for NOC to certify the Proposed Integrated Solid Waste Management facility for Gurugram and Faridabad is outside the defined Eco-Sensitive zone of the Asola Wildlife Sanctuary.**

Ref: CCF (WL), Gurugram letter No. 401 dated 06-07-2019

****

Wildlife NOC is accorded for setting up installation of Integrated Solid Waste Management facility, falling in the revenue estate of village Bandhwari, Gurugram, State-Haryana, subject to the following terms and conditions:-

1. The proposed site is situated at a distance of 27.5 Kilometer from boundary of Sultanpur National Park. The Chief Conservator of Forests (Wildlife), Gurugram has perused the conservation plan submitted by the project proponent. The conservation plan (copy attached) prepared for Schedule-I and Schedule-II animal found in the area is in order hence acceptable as it includes all the necessary interventions required for the conservation of the local fauna included in schedule I and II of Wildlife Protection Act, 1972. The proposed conservation plan will be implemented in a phased manner with a total cost of Rs. 2.0 Crore (Two Crore) within a period of (5) Five years. You are hereby directed to deposit the conservation plan cost Rs 2.00 Crore (2 Crore) in O/o DWLO, Gurugram.
2. Project Authority will not violate any provision of Ministry of Environment and Forest Notification dated 27 Jan 2010 regarding Eco-Sensitive zone of Sultanpur National Parks and Asola Bhatti Notification dated 31-05-2018 & Wildlife (Protection) Act, 1972.
3. Noise limit of all the constructions equipment, etc. should be observed.
4. All the activities to be undertaken inside ESZ will be in consultation with the Divisional Wildlife Officer,Gurugram.
5. The project recommendation is subject to the existing directives of Hon'ble Supreme Court and provisions of Forest (Conservation) Act, 1980.
6. Project Authority will seek necessary/mandatory permission from the other concerned departments as applicable and will not violent rule, if any.

09/7/19
Principal Chief Conservator of Forests
& Chief Wildlife Warden,
Haryana, Panchkula.

Endst. No. dated:-

A copy is forwarded to

1. Deputy Commissioner, Gurugram, Chairman of Monitoring Committee, of Eco-Sensitive Zone, Sultanpur National Park.
2. CCF (Wildlife), Gurugram for information and necessary action.

Sd/-
Principal Chief Conservator of Forests
& Chief Wildlife Warden,
Haryana, Panchkula.

THE END

966136/2021/swm.Br

EXECUTIVE SUMMARY

IN

ENGLISH & HINDI FOR PUBLIC CONSULTATION

FOR

ENVIRONMENT CLEARANCE

"Proposed Expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW at Integrated Municipal Solid Waste Management (IMSWM) Processing Facility"

At Village - Bandhwari, District - Gurugram, Haryana
By Municipal Corporation Gurugram (MCG)
Total Area: - 30.5 Acre,

Category of Project - "A" Project schedule 1(d)
Proposed Waste to Energy Plant: - 25 MW
Processing Facility: - 2100 TPD

Applicant:

Municipal Corporation of Gurugram
C-1, Info city, Sector- 34,
Gurugram-122004

EXECUTIVE SUMMARY

Name of Project: Proposed Expansion of Waste to Energy (WTE) plant from 15 MW to 25 MW at Integrated Municipal Solid Waste Management (IMSWM) Processing Facility at Bandhwari Village, Dist. Gurugram, Haryana by Municipal Corporation Gurugram (MCG).

1. Introduction

The proposed project is for expansion of waste to Energy (WTE) plant from 15 MW to 25 MW at integrated municipal solid waste management facility at Bandwari village, Gurugram, Haryana State (2100 TPD Capacity). MCG proposes to enhance the waste processing & disposal services by expanding the Capacity of existing 15 MW Waste to Energy Plant to 25 MW Waste to Energy Plant along with RDF Plant- 1500 TPD, Composting Facility- 210 TPD and Sanitary landfill area- 24680 sqm within the existing MSW Facility.

2. Identification of Project & Project Proponent

Municipal Corporation Gurugram (MCG) are proposing for expansion of WTE plant from 15 MW to 25 MW in IMSWM facility at Bandhwari is categorized under Item "1(d) Thermal Power Plants- Waste to Energy (WTE)" as per EIA Notification, dated September 14, 2006 and its subsequent amendments and all electricity generating units of capacity > 20 MW (using municipal solid non-hazardous waste as fuel) will be treated as category-A project will require Environmental Clearance from MoEF&CC.

The proposed project of Integrated Municipal Solid Waste Management (IMSWM) Processing Facility with Waste to Energy (WTE) plant of 25 MW capacity is interlinked to sector - 7(i) Common Municipal Solid Waste Management Facility (CMSWMF) and sector- 1(d) Thermal Power Plants- Waste to Energy (WTE) as per EIA Notification 2006 & its subsequent amendments.

Application for Terms of Reference (ToR) was applied and proposal was recommended by EAC (Thermal Power Projects) in its meeting on dt: 28.07.2020 and granted ToR vide F.no. J-13012/08/2020 –IA.I (T) on dt: 16.09.2020 for further conducting EIA/EMP study for the proposed expansion.

3. Project Details

The IMSWM facility along with expanded capacity of WTE (25 MW) is spread over an area of 30.5 acres in Bandhwari Village. Brief of project details with environment setting, location details, resources requirements for project and project cost are given below:

<table>
<tr><th>Sr.No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td>A.</td><td>Nature of the Project</td><td>Integrated Municipal Solid Waste Management (IMSWM) Processing Facility with proposed expansion of Waste to Energy (WTE) Plant from 15 MW to 25 MW capacity.</td></tr>
<tr><td>B.</td><td colspan="2">Size of the Project</td></tr>
<tr><td></td><td>Existing & Proposed Capacity</td><td>Waste quantity: 1165 TPD in 2015, 1565 TPD in 2025 & estimated waste quantity in 2035 will be 2100 TPD (as per 2011 census)
IMSWM-WTE Project Area - 30.5 Acres

<table>
<tr><th>Project Activity/ Components</th><th>As per EC awarded</th><th>Proposed expansion</th></tr>
<tr><td>Total capacity of facility</td><td>2100 TPD</td><td>NIL</td></tr>
<tr><td>RDF plant</td><td>1500 TPD</td><td>NIL</td></tr>
<tr><td>Composting</td><td>147 TPD</td><td>210 TPD</td></tr>
<tr><td>Area for SLF</td><td colspan="2">24680 Sqm</td></tr>
<tr><td>Waste to Energy (RDF based)</td><td>15 MW</td><td>25 MW</td></tr>
</table>

Therefore, the following are proposed for expansion in WTE plant:
• Proposed expansion to 25 MW
• Mechanical Grate type Boilers: 2 No. (750 TPD/each)
• Steam Turbine Generator: 1 no. 25 MW
• Bag Filters System</td></tr>
<tr><td>2.</td><td>Composting</td><td>210 TPD</td></tr>
<tr><td>3.</td><td>RDF Plant</td><td>1500 TPD</td></tr>
<tr><td>4.</td><td>Sanitary Landfill</td><td>Area: 24680 Sqm,</td></tr>
<tr><td>5.</td><td>Waste to Energy (WTE) Plant</td><td>25 MW</td></tr>
<tr><td>6</td><td>Fuel Supply & Availability for Proposed WTE of 25 MW</td><td>Municipal Solid Waste (MSW) shall be processed to make RDF/ Combustible material further to use as</td></tr>
</table>

<table>
<tr><th>Sr.No.</th><th>Particulars</th><th>Details</th></tr>
<tr><td></td><td></td><td>fuel for Power generation.</td></tr>
<tr><td>C</td><td colspan="2">Location Details</td></tr>
<tr><td>1.</td><td>Plot no./Kasra no.</td><td>46//5/26,15,16,17/1,24/1,24/2,25,
47//8,9,10,11,12,13,18,19,20,21,22,23,
48//1,2,9,10,11,49//3/3,4,5,7,8/1,13/2,14,15</td></tr>
<tr><td>2.</td><td>Latitude & Longitude of Project site</td><td>A. 28°24'14.89"N 77°10'16.86"E
B. 28°24'13.13"N 77°10'27.39"E
C. 28°24'01.35"N 77°10'18.83"E
D. 28°24'02.72"N 77°10'11.54"E</td></tr>
<tr><td>3.</td><td>Topo sheet No.</td><td>53H/3, 53H/7</td></tr>
<tr><td>4.</td><td>Village</td><td>Bandhwari</td></tr>
<tr><td>5.</td><td>Tehsil</td><td>Gurugram</td></tr>
<tr><td>6.</td><td>District</td><td>Gurugram</td></tr>
<tr><td>7.</td><td>State</td><td>Haryana</td></tr>
<tr><td>D</td><td colspan="2">Environmental Settings of the Area</td></tr>
<tr><td>1.</td><td>Ecological Sensitive Areas</td><td>Asola Wildlife Sanctuary boundary exists at 300 m in NE direction from the project site and is beyond Eco Sensitive Zone (ESZ) of Asola WLS which is 150 m at ID P-9 & P-10 points (nearest points to site) as per MoEF&CC notification no. 5.0.1911 (E) dated 31st May 2019 in reference of Asola Bhatti Wildlife Sanctuary.
NOC & Clarification letter regarding the same has been obtained.</td></tr>
<tr><td>2.</td><td>River / water body</td><td>
<table>
<tr><th>River/ water body</th><th>Distance</th><th>Direction</th></tr>
<tr><td>Jauhar Nala</td><td>1.14 km</td><td>SE</td></tr>
<tr><td>Lake Shail</td><td>2.25</td><td>SE</td></tr>
<tr><td>Water body near village Gothda Mohbtabad</td><td>3.73</td><td>SSE</td></tr>
<tr><td>Li Nala</td><td>3.72 km</td><td>NW</td></tr>
<tr><td>Sharpur Nala</td><td>5.92 km</td><td>NNE</td></tr>
<tr><td>Paliwala Nala</td><td>6.22 km</td><td>E</td></tr>
<tr><td>Harcliandpur Distributary</td><td>6.72 km</td><td>SE</td></tr>
<tr><td>Lake Niharika</td><td>7.81</td><td>E</td></tr>
<tr><td>Nekpur Miner</td><td>8.41 km</td><td>ESE</td></tr>
<tr><td>Bhiruya Nala</td><td>9.35 km</td><td>ENE</td></tr>
<tr><td>Fatehpur Miner</td><td>9.86 km</td><td>SSE</td></tr>
<tr><td>Barkhal Lack</td><td>9.70 km</td><td>E</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>Nearest Town / City</td><td>Gurugram- 6.44 Km; Faridabad – 9.67 Km</td></tr>
</table>

Sr.No.	Particulars	Details
4.	Nearest Railway Station	Faridabad Railway Station at 13.7 km in East Direction
5.	Nearest Airport	Indira Gandhi International Airport at 18.10 km in NNW Direction. NOC from Airports Authority of India has been obtained through vide letter no. AAI/RHR/NR/ATM/NOC/2018/288/1517-1520 dated: 04.09.2018.
6.	State Boundary	Interstate Boundary of Haryana and Delhi lies at 0.98 km from the site
7.	Seismic Zone	Zone – IV [as per IS 1893 (Part-I): 2002]
E	**Cost Details**	
1.	Total Project Cost	61700.92 Lakhs
F	**Requirements of the Project**	
1.	Water Requirement	Construction Phase: 8 -10 KLD Source: Municipal Corporation of Gurgaon Operation Phase: 792 KLD (for MSW Processing & WTE plant) + 12 KLD (for Domestic) Source: Nearby STP approved by GMDA and drinking water, separately through MCG approved water tankers. Approval from GMDA to receive 4 MLD reclaimed water from STP for the project operation was obtained Memo no. GMDA/S&S/2018/579 on 24.05.2018.
2.	Power Requirement	Construction Phase: 675 KW (backed up through 630 KVA DG set.) Operation Phase: auxiliary supply from proposed waste to energy plant (backup through 1500 KVA DG set)
3.	Manpower requirement	Construction Phase: Around 600 workers Operation Phase: 2100 (Including manpower required for Waste collection & Transportation)

4. Baseline Environmental Studies

Field studies were carried out to establish the existing environmental status (air, water, noise, soil, and ecology) and prevailing socio-economic conditions. A study area of 10 km radius from the project site was identified to establish the present environmental and socio-economic conditions. The baseline studies were carried out during the post monsoon season October 2020 to December 2020.

During the study period, wind direction was predominantly recorded from NW closely followed by W. Calm condition prevailed for 0.27% of the total time and the average wind speed for the season is 3.40 m/s.

Ambient Air Quality

Ambient Air Quality samplers were installed at 8 different locations for estimating the particulate and gaseous pollutants. The monitoring locations were selected in downwind, cross wind and upwind direction of the existing project location. At each location, monitoring was carried out at a frequency of 2 days per week for 12 weeks during the study period, as per the NAAQM guidelines.

PM2.5 levels were recorded in the range of 98.04-144.23 µg/m^3 while PM10 levels were in the range of 154.42-354.37 µg/m^3. SO_2 concentrations were in the range of 12.69-19.99 µg/m^3 and NOx concentrations were in the range of 27.29-74.09 µg/m^3. Ammonia concentrations were in the range of 24.81-69.92 µg/m^3 and Ozone concentrations were in the range of 8.81-49.13 µg/m^3. CO levels were in the range of 1.09 to 2.06 mg/m3..

The observed concentrations were compared with CPCB standards (National Ambient Air Quality Standards, 2009) It is observed that the monitored parameters are within the permissible limits as per NAAQS, 2009 during the study period except PM10 & PM2.5 which were very high due to the continuous practice of stubbles burning in nearby villages in Haryana as well as Delhi.

Water Quality Monitoring

A total of 8 ground water and 3 surface water samples were collected from different sources within the study area and analyzed for all important physico-chemical Characteristics to establish the quality of water prevailing in the project surroundings. The ground water samples were drawn from the hand pumps and bore wells used by the villagers for their domestic needs. Surface water samples were taken from the Lake & Pond in the study area.

It is identified that the pH values of ground water were in the range of 6.58 to 7.27, while pH values of surface water were in the range of 6.85 to 7.79. The TDS values of ground water were in the range of 464 mg/l to 2988 mg/l, while the TDS values of surface water were in the range of 274 to 326 mg/l. Chloride concentrations of

ground water were in the range of 48 mg/l to 1085 mg/l, while surface water values were in the range of 26 to 64 mg/l. The hardness of ground water was in the range of 276 mg/l to 1120 mg/l, while hardness of surface water was in the range of 116 to 180 mg/l.

Noise Monitoring

Noise levels were monitored at 8 locations within the study area, using a continuous noise measurement device. The day levels of noise have been monitored during 6 AM to 10 PM and the night levels during 10 PM to 6 AM. The day equivalent values during the study period were in the range of 46.6 to 56.1 dB(A) while the night equivalents were in the range of 35.2 to 40.6 dB (A). From the results it can be seen that the day equivalent values and the night equivalent values were within the ambient noise standards of residential area.

Soil Quality

A total of 8 soil samples were collected from different locations within the study area. The sampling locations were selected to assess the existing soil conditions representing various land use conditions and geological features. From the analysis of soil samples, it is found that in the study area, the pH values varied from 6.89 to 7.54, the organic carbon varies from 0.14 to 0.69 %, the available Nitrogen from 144.9 to 340.2 kg/ha, the available Phosphorus varies from 32.25 to 85.08 kg/ha and the available Potassium from 126.92 to 179.55 kg/ha.

Ecological Environment

The biological study of the area has been conducted in order to understand the ecological status of the existing flora and fauna to generate baseline information and evaluate the probable impacts on the biological environment. Asola Wildlife Sanctuary is situated to 300 m NE direction from the project site.

NOC from the Principal Chief Conservator of Forest and Chief Wildlife Warden, Haryana was obtained vide letter no. 992 on dated: 09/07/19 certifying that the project is outside the defined Eco-sensitive zone of the Asola Bhatti Wildlife

Sanctuary as per Notification dated: 31.05.2019. Hence, clearance from NBWL is not applicable for the project. A detailed site specific conservation plan & wildlife management plan was prepared and approved by Principal Chief Conservator of Forest & Chief Wildlife Warden, Haryana vide letter no. 992 dated: 09/07/19

Socio – Economic Environment

Total population of the study area is 153342 persons. Out of which 82571 (53.8%) are male and 70771 (46.2%) are female. SC total population is 21848 out of which 11656 (53.4%) are male and 10192 (46.6%) are female.

Literacy Rate is the amount of people in a country with the ability to read and write. The analysis of the literacy levels is done in the study area. Literacy in any region is key for socio-economic progress and the Indian literacy rate grew to 74.04% in 2011 from 12% at the end of British rule in 1947. Although this was a greater than six fold improvement, the level is well below the world average literacy rate of 84% and of all nations.

5. Anticipated Environmental Impacts and Mitigation Measures

The potential impacts on the environment from the proposed project are identified based on the nature of various activities associated with the project implementation and project operations (impacts during construction phase and operation phase).

Impacts during Construction Phase

Construction phase works include site clearance, site formation, building works, infrastructure provision and any other infrastructure activities. The impacts due to construction activities are short term and are limited to the construction phase. The impacts will be mainly on air quality, water quality, soil quality and socio-economics. All necessary control measures will be taken to minimize the impacts. As the project site is already in operation and well maintained by leveling and developed with thick green belt, there will not be any impact of dust or other pollution due to the proposed activities.

Impacts during Operations Phase

During the operation phase of the proposed project there would be impacts on the air, water and land environment and socio-economic aspects.

Impact on Air Quality

The main sources of air pollution include point source emissions from incinerator and DG sets as well as emissions from landfill operations. For estimation of post project scenario, maximum Ground Level Concentrations (GLC) of 24- hour average for Particulate Matter (PM), SO2 and NOx were predicted and superimposed on the corresponding maximum baseline concentrations. The overall scenario with predicted concentrations over the maximum baseline concentrations of PM10 – 354.88 µg/m3, SO2 – 20.64 µg/m3, NOX – 76.7 µg/m3.

Incinerator will be equipped with all necessary Flue Gas Cleaning/Purification System (FGCS) including spray drier, SNCR system, cyclone, scrubber, bag filter etc. to comply with emission standards. Also incinerator will be provided with a 60m stack height. The emissions from DG sets will be minimal since they will be operated only during power failure. All the vehicles will be regularly serviced and maintained properly to minimize emissions. All the internal roads will be maintained properly to minimize dust generation. Proper tree plantation/green cover will be maintained around the project boundary.

Impact on Water Quality

During operational phase, there is a potential threat for the contamination of ground water due to the generation of leachates particularly during rains when the surface runoff infiltrate down the surface of finished and the operational cells of the landfills. Sewage generated from domestic activities of workers at the site can be potential source of ground water contamination if not managed properly. As per the management plan the ground water quality shall be monitored at regular intervals in the operational phase of the project to check for contamination.

Impact on Land Environment

During the operation phase of the project, the soil may get polluted/contaminated from littering of various kinds of municipal wastes, leakage of leachates and due to fly ash or bottom ash. No significant impact is expected on the top soils on and around the site. It is imperative to establish a well-planned solid waste collection, storage and segregation system management at site. Only covered trucks will be allowed to enter the site for unloading of municipal solid waste materials, good housing keeping will help to control the contamination of soil.

Impact on Ecology

A green belt will be developed along the periphery of the proposed project which will limit noise reaching outside the project boundary, odour management and provide habitat to small birds and mammals; No activities shall be planned in the green buffer other than approach/ service road. Employees should be aware about wild animals. No illegal hunting and poaching activities to be allowed in the study area;

Impact on Socio Economics

The proposed facility is likely to provide direct and indirect employment and likely to increase the socio-economic status of the nearby villages in the study area. Due to the proposed project the facilities for public transport, water supply, telecommunications, education, public health etc. are likely to improve. The proposed facility provides good waste handling practices which will greatly reduce foul smell and reduce impact from odors, thus avoiding environmental damage due to unorganized disposal. The habitats in the surrounding industrial estates are greatly benefited in terms of health status and economy.

6. Environment Monitoring Program

The major construction activities involved in setting up the expansion unit are construction of sheds for treatment units, stores, etc. major components in the proposed plant are landfill, waste to energy plant, diesel generator, FGCS, LTP cathode ray tube cutter and other civil, mechanical and electrical equipment. The construction activities require preparation of site, remediation of existing old dump, mobilization of construction material and equipment. The construction activities are expected to last for few months.

During construction phase of landfill and WTE at every stage quality of construction will be monitored viz. base preparation, liners quality, drainage layers, leachate collection system, FGCS, storm water management system, gas vent systems, etc

Environmental Monitoring Program includes: (i) continuous online monitoring of the incinerator stack emission for flue gas parameters, (ii) incinerator stack emission monitoring to ensure compliance with emission standards, (iii) periodic analysis of water from monitoring borewells, (iv) ambient air quality monitoring, (v) analysis of treated wastewater, especially in case of discharge, (vi) periodic monitoring of incineration ash and sludge etc., (vii) other parameters as prescribed in Consent to Operation (CTO) etc.

7. Environment Management Plan

The Environmental Management Plan (EMP) is required to ensure sustainable development in the area of the proposed project site. Hence, it needs proper Environmental Management Plan (EMP) to meet these objectives. The purpose of the Environmental Management Plan is to minimize the potential environmental impacts from the project and to mitigate the adverse impacts. . Minimum 33% of the total plot area shall be developed as greenbelt as per CPCB guidelines. The budget allocated for implementation of EMP is Rs 2870 lakhs with a recurring cost of Rs. 286 lakhs per annum. The total project cost including proposed expansion is Rs. 617.01 Cr which includes cost for IMSWM –WTE (15 MW) - 330.48 Cr and cost for proposed expansion of WTE to 25 MW- 286.53 Cr, i.e Rs 286.53 + 330.48 = 617.01Cr.

8. Project Benefits

The proposed project will have direct and indirect economic benefits in form of employment, development of ancillaries, establishment of service facilities, development of telecom and transportation facilities. The compost production from IMSWM would add to the revenue of state as per CCA and compost shall also enhance the crop productivity and improvement in the soil texture and enhancement of soil nutrients resulting increase in fertility of soil. The compost produced from the composting pads can be used as soil conditioner that improves soil quality. This compost has the ability to help regenerate poor soil by increasing nutrient content in soil and retain moisture.

The following benefits are being envisioned:-

- Use of compost produced as manure to the crops.
- Generation of revenue through the sale of compost produced from the MSW processing and disposal facility.

9. Conclusion

The EIA study has made an overall assessment of the potential environmental impacts likely to arise from the proposed Expansion of WtE plant (from 15 MW to 25 MW) setting up in the existing Integrated Municipal Solid Waste Management Facility of Municipal Corporation Gurugram. Baseline data was collected for various environmental attributes so as to compute the impacts that are likely to arise due to the proposed project which include emissions arising out of the present IMSWM project activities.

The potential impacts on the environment from the proposed project are identified based on the nature of various activities associated not only with the project implementation and operation, but also on the current status of the environmental quality at the project site. Mitigation measures are proposed to minimize the adverse impacts if any due to the project in the form of Environment Management Plan.

आधिकारिक सारांश

परियोजना का नाम - प्रस्तावित विस्तार वेस्ट टू एनर्जी (डब्ल्यूटीई) संयंत्र 15 मेगावाट से 25 मेगावाट एकीकृत नगर ठोस अपशिष्ट प्रबंधन (IMSWM) प्रसंस्करण सुविधा, गाँव - बंधवाड़ी, जिला- गुरुग्राम, हरियाणा, नगर निगम गुरुग्राम द्वारा

1. परिचय

एकीकृत नगर ठोस अपशिष्ट प्रबंधन (IMSWM) प्रसंस्करण सुविधा (क्षमता - 2100 टी.पी.डी), गाँव - बंधवाड़ी, जिला- गुरुग्राम, हरियाणा में वेस्ट टू एनर्जी (डब्ल्यूटीई) संयंत्र 15 मेगावाट से 25 मेगावाट के विस्तार हेतु प्रस्तावित है। मौजूदा MSW सुविधा में एमसीजी ऊर्जा संयंत्र के लिए मौजूदा 15 मेगावाट अपशिष्ट की क्षमता को बढ़ाकर 25 मेगावाट अपशिष्ट को ऊर्जा संयंत्र में विस्तारित करके अपशिष्ट प्रसंस्करण और निपटान सेवाओं को बढ़ाने का प्रस्ताव RDF प्लांट- 1500 टीपीडी, कम्पोस्टिंग सुविधा- 210 एवं Sanitary landfill area- 24680 sqm के साथ करता है।

2. परियोजना और परियोजना प्रस्तावक की पहचान

नगर निगम गुरुग्राम, बंधवाड़ी में IMSWM सुविधा में डब्ल्यूटीई संयंत्र को 15 मेगावाट से 25 मेगावाट तक विस्तार के लिए ईआईए अधिसूचना के अनुसार, 14 सितंबर, 2006 और उसके बाद के संशोधन के तहत प्रस्तावित किया जा रहा है। सभी बिजली पैदा करने वाली इकाइयां क्षमता > 20 मेगावाट (ईंधन के रूप में नगरपालिका के ठोस गैर-खतरनाक कचरे का उपयोग करके) को श्रेणी-ए परियोजना के रूप में माना जाएगा, एमओईएफ और सीसी से पर्यावरणीय मंजूरी की आवश्यकता होगी।

प्रस्तावित 25 मेगावाट वेस्ट टू एनर्जी (डब्ल्यूटीई) संयंत्र एकीकृत नगर ठोस अपशिष्ट प्रबंधन (IMSWM) प्रसंस्करण सुविधा को ईआईए अधिसूचना 2006 और उसके बाद के संशोधन के तहत सेक्टर - 7 (i) के कॉमन म्युनिसिपल सॉलिड वेस्ट मैनेजमेंट फैसिलिटी (CMSWMF) और सेक्टर- 1 (d) थर्मल पावर प्लांट्स- वेस्ट टू एनर्जी (WTE) से इंटरलिंक किया गया है।

टर्म्स ऑफ़ रिफरेन्स (ToR) के लिए आवेदन किया गया था एवं EAC (थर्मल पावर प्रोजेक्ट्स) की मीटिंग दिनांक 28.07.2020 के दौरान (ToR) प्रस्ताव की सिफारिश की गई और प्रस्तावित विस्तार के लिए EIA / EMP अध्ययन को आगे बढ़ाने के लिए दिनांक 16 /09 /2020 को ToR ग्रांट किया गया जिसका लेटर न J-13012/08/2020 –IA.I (T) है।

परियोजना विवरण

(25 मेगावाट) वेस्ट टू एनर्जी प्लांट क्षमता के साथ IMSWM सुविधा बंधवाड़ी ग्राम में 30.5 एकड़ क्षेत्र में फैली हुई है। पर्यावरण सेटिंग, स्थान का विवरण, परियोजना संसाधनों और परियोजना लागत के लिए आवश्यकताओं के साथ परियोजना विवरण का संक्षिप्त विवरण नीचे दिया गया है:

क्रमांक	विवरण	विस्तार
A.	**परियोजना की प्रकृति**	इंटीग्रेटेड म्यूनिसिपल सॉलिड वेस्ट मैनेजमेंट (IMSWM) प्रोसेसिंग फैसिलिटी विथ वेस्ट टू एनर्जी (डब्ल्यूटीई) प्लांट का प्रस्तावित क्षमता विस्तार 15 मेगावाट से 25 मेगावाट।
B.	**परियोजना का आकार**	
	मौजूदा और प्रस्तावित क्षमता	अपशिष्ट मात्रा: 1165 TPD in 2015, 1565 TPD in 2025 &

<table>
<tr><th>क्रमांक</th><th>विवरण</th><th>विस्तार</th></tr>
<tr><td></td><td></td><td>अनुमानित अपशिष्ट मात्रा 2035 में 2100 TPD (2011 की जनगणना के अनुसार)
IMSWM-WTE प्रोजेक्ट छेत्र - 30.5 एकड़

<table>
<tr><th>परियोजना गतिविधि / घटक</th><th>EC के अनुसार</th><th>प्रस्तावित विस्तार</th></tr>
<tr><td>सुविधा की कुल क्षमता</td><td>2100 TPD</td><td>NIL</td></tr>
<tr><td>RDF संयंत्र</td><td>1500 TPD</td><td>NIL</td></tr>
<tr><td>खाद</td><td>147 TPD</td><td>210 TPD</td></tr>
<tr><td>SLF के लिए क्षेत्र</td><td colspan="2">24680 Sqm</td></tr>
<tr><td>वेस्ट टू एनर्जी (RDF आधारित)</td><td>15 MW</td><td>25 MW</td></tr>
</table>

इसलिए, डब्ल्यूटीई संयंत्र में विस्तार के लिए निम्नलिखित प्रस्ताव हैं::
• प्रस्तावित विस्तार- 25 मेगावाट
• मैकेनिकल ग्रेट बॉयलर: 2 No. (750 TPD/each)
• स्टीम टर्बाइन जेनरेटर: 1 no. 25 MW
• बैग फिल्टर सिस्टम</td></tr>
<tr><td>2.</td><td>खाद</td><td>210 TPD</td></tr>
<tr><td>3.</td><td>RDF संयंत्र</td><td>1500 TPD</td></tr>
<tr><td>4.</td><td>सैनिटरी लैंडफिल</td><td>क्षेत्र: 24680 Sqm,</td></tr>
<tr><td>5.</td><td>वेस्ट टू एनर्जी (WTE) प्लांट</td><td>25 MW</td></tr>
<tr><td>6</td><td>प्रस्तावित डब्ल्यूटीई 25 मेगावाट के लिए ईंधन की आपूर्ति और उपलब्धता</td><td>नगरपालिका ठोस अपशिष्ट (MSW) को बिजली उत्पादन करने के लिए ईंधन के रूप में उपयोग करने के लिए RDF / दहनशील सामग्री बनाने के लिए संसाधित किया जाएगा।</td></tr>
<tr><td>C</td><td colspan="2">स्थान का विवरण</td></tr>
<tr><td>1.</td><td>प्लॉट नं. / खसरा नं.</td><td>46//5/26,15,16,17/1,24/1,24/2,25,
47//8,9,10,11,12,13,18,19,20,21,22,23,
48//1,2,9,10,11,49//3/3,4,5,7,8/1,13/2,14,15</td></tr>
<tr><td>2.</td><td>परियोजना स्थल के अक्षांश और देशांतर</td><td>A. 28°24'14.89"N 77°10'16.86"E
B. 28°24'13.13"N 77°10'27.39"E
C. 28°24'01.35"N 77°10'18.83"E
D. 28°24'02.72"N 77°10'11.54"E</td></tr>
<tr><td>3.</td><td>टोपो शीट नं</td><td>53H/3, 53H/7</td></tr>
<tr><td>4.</td><td>ग्राम</td><td>बंधवाड़ी</td></tr>
<tr><td>5.</td><td>तहसील</td><td>गुरुग्राम</td></tr>
</table>

<table>
<tr><th>क्रमांक</th><th>विवरण</th><th>विस्तार</th></tr>
<tr><td>6.</td><td>जिला</td><td>गुरुग्राम</td></tr>
<tr><td>7.</td><td>राज्य</td><td>हरियाणा</td></tr>
<tr><td>D</td><td colspan="2">क्षेत्र की पर्यावरणीय सेटिंग</td></tr>
<tr><td>1.</td><td>पारिस्थितिक संवेदनशील क्षेत्र</td><td>असोला वाइल्डलाइफ सैंक्चुअरी सीमा परियोजना स्थल से NE दिशा में 300 मीटर की दूरी पर मौजूद है और असोला डब्ल्यूएलएस के इको सेंसिटिव जोन (ईएसजेड) से परे है जो आईडी पी -9 और पी -10 अंक (साइट के निकटतम बिंदु) पर 150 मीटर है। अधिसूचना सं. 5.0.1911 (E) दिनांक 31 मई 2019 को असोला भट्टी वन्यजीव अभयारण्य के तहत.
इसी के संबंध में अनापत्ति प्रमाण पत्र प्राप्त किया गया है।.</td></tr>
<tr><td>2.</td><td>नदी / जल निकाय</td><td>
<table>
<tr><th>नदी / जल निकाय</th><th>दूरी</th><th>दिशा</th></tr>
<tr><td>जौहर नाला</td><td>1.14 km</td><td>SE</td></tr>
<tr><td>झील शैल</td><td>2.25</td><td>SE</td></tr>
<tr><td>गांव गोठड़ा मोहब्ताबाद के पास जलघर</td><td>3.73</td><td>SSE</td></tr>
<tr><td>ली नाला</td><td>3.72 km</td><td>NW</td></tr>
<tr><td>शारपुर नाला</td><td>5.92 km</td><td>NNE</td></tr>
<tr><td>शारपुर नाला</td><td>6.22 km</td><td>E</td></tr>
<tr><td>हरसिलीनपुर डिस्ट्रीब्यूटरी</td><td>6.72 km</td><td>SE</td></tr>
<tr><td>निहारिका झील</td><td>7.81</td><td>E</td></tr>
<tr><td>नेकपुर खान</td><td>8.41 km</td><td>ESE</td></tr>
<tr><td>भिरुआ नाला</td><td>9.35 km</td><td>ENE</td></tr>
<tr><td>फतेहपुर माइनर</td><td>9.86 km</td><td>SSE</td></tr>
<tr><td>बरखल अभाव</td><td>9.70 km</td><td>E</td></tr>
</table>
</td></tr>
<tr><td>3.</td><td>निकटतम शहर</td><td>गुरुग्राम - 6.44 Km; फरीदाबाद – 9.67 Km</td></tr>
<tr><td>4.</td><td>नजदीकी रेलवे स्टेशन</td><td>पूर्व दिशा में 13.7 किमी पर फरीदाबाद रेलवे स्टेशन</td></tr>
<tr><td>5.</td><td>निकटतम हवाई अड्डा</td><td>NNW दिशा में 18.10 किमी पर इंदिरा गांधी अंतर्राष्ट्रीय हवाई अड्डा. दिनांक: 04.09.2018 को भारतीय विमानपत्तन प्राधिकरण से अनापत्ति प्रमाण पत्र प्राप्त किया गया है। लेटर न. एएआई / आरएचआर / एनआर / एटीएम / एनओसी / 2018/288 / 1517-1520.</td></tr>
<tr><td>6.</td><td>राज्य की सीमा</td><td>हरियाणा और दिल्ली की अंतरराज्यीय सीमा स्थल से 0.98 किमी दूर है</td></tr>
<tr><td>7.</td><td>भूकंपीय क्षेत्र</td><td>जोन - IV [आईएस 1893 के अनुसार (भाग- I): 2002]</td></tr>
<tr><td>E</td><td colspan="2">लागत विवरण</td></tr>
<tr><td>1.</td><td>कुल परियोजना लागत</td><td>61700.92 लाख</td></tr>
</table>

क्रमांक	विवरण	विस्तार
F	**परियोजना की आवश्यकताएँ**	
1.	पानी की आवश्यकता	निर्माण चरण: 8 -10 केएलडी स्रोत: नगर निगम गुड़गांव ऑपरेशन चरण: 792 केएलडी ((एमएसडब्ल्यू प्रसंस्करण और डब्ल्यूटीई संयंत्र के लिए)) + 12 केएलडी (घरेलू के लिए) स्रोत: नज़दीकी GMDA द्वारा स्वीकृत एसटीपी और पीने का पानी, अलग से एमसीजी के जरिए स्वीकृत पानी टैंकर द्वारा प्राप्त किया जायेगा । परियोजना के संचालन के लिए एसटीपी से 4 एमएलडी पुनर्निर्मित पानी प्राप्त करने के लिए जीएमडीए से दिनांक 24.05.2018 को स्वीकृति ली गयी । मेमो नं. GMDA/S&S/2018/579
2.	पावर आवश्यकता	निर्माण चरण: 675 किलोवाट (बैकअप 630 केवीए डीजी सेट) ऑपरेशन चरण: प्रस्तावित वेस्ट टू एनर्जी संयंत्र से सहायक आपूर्ति (बैकअप 1500 केवीए डीजी सेट)
3.	जनशक्ति की आवश्यकता	निर्माण चरण: लगभग 600 श्रमिक ऑपरेशन चरण: 2100 (अपशिष्ट संग्रह और परिवहन के लिए आवश्यक श्रमशक्ति सहित)

आधारभूत पर्यावरणीय स्थिति

हवा, पानी, शोर, मिट्टी, पारितंत्र और सामाजिक-आर्थिक स्थितियों का पता लगाने के लिए मौजूदा आरंभिक पर्यावरण क्षेत्र का नमूना लेने के लिए क्षेत्र की जाँच की गई। परियोजना क्षेत्र के 10 किमी त्रिज्या वाले एक अध्ययन क्षेत्र को ऊपर वर्णित पर्यावरणीय घटकों के लिए वर्तमान पर्यावरणीय स्थितियों को स्थापित करने के लिए पहचाना गया। फील्ड का डाटा अक्टूबर 2020 से दिसंबर 2020 तक शीतऋतू में लिया गया ।

अध्ययन की अवधि के दौरान, हवा की दिशा मुख्य रूप से NW-SE दर्ज की गई, तथा हवा की औसत गति लगभग 3.40 मी./से. है।

परिवेशी हवा की गुणवत्ता

परिवेशी हवा की गुणवत्ता निगरानी केंद्र 8 अलग-अलग स्थानों पर स्थापित किए गए। ये स्थान प्रस्तावित परियोजना के डाउनविंड, क्रॉस विंड और अप विंड क्षेत्रों में चुने गए थे। 8/24 घंटे पर हवा के सामान्य प्रदूषकों, पार्टिकुलेट मैटर (PM_{10} – $PM_{2.5}$), सल्फर डाईऑक्साइड (SO_2), नाइट्रोजन के ऑक्साइड (NOx), कार्बन मोनोक्साइड (CO), अमोनिया (NH_3), बेंजीन (C_6H_6), मिथेन (CH_4), नॉन मीथेन हाइड्रो कार्बन्स, लेड (Pb), निकेल (Ni), ओज़ोन (O_3), आर्सेनिक (As), हाइड्रोजन सल्फाइड (H_2S), (VOCs) और बेंज़ो (a) पायरीन (BaP) का नमूना लिया गया और एमओईएफ की अपेक्षाओं को पूरा करने के लिए 24 घंटे में उनके परिणामों का औसत निकाला गया तथा सीपीसीबी एवं NAAQS द्वारा निर्धारित मानकों से इनकी तुलना की गई।

पार्टिकुलेट मैटर का 98 प्रतिशत स्तर < 2.5 माइक्रोन 98.04 से 144.23 $\mu g/m^3$ के बीच दर्ज किया गया, जबकि पार्टिकुलेट मैटर <10 माइक्रोन 154.42 से 354.37 $\mu g/m^3$ के बीच की रेंज में पाये गए ।

सल्फर डाईऑक्साइड की सांद्रता 12.69 से 19.99 $\mu g/m^3$, नाइट्रोजन के ऑक्साइड 27.29 से 74.09 $\mu g/m^3$ और कार्बन मोनोऑक्साइड CO 1.09 to 2.06 mg/m^3 के रेंज में देखे गए । देखे गए सांद्रता की तुलना सीपीसीबी मानकों (राष्ट्रीय परिवेश वायु गुणवत्ता मानक, 2009) से की गई थी। यह देखा गया है कि मॉनिटर किए गए पीएम 10 और पीएम 2.5 के अलावा बाकि सरे पैरामीटर NAAQS, 2009 के अनुसार अनुमेय सीमा के भीतर हैं, पीएम 10 और पीएम 2.5 का अधिक होना हरियाणा के साथ-साथ दिल्ली के आस-पास के गाँवों में भी लगातार पराली जलाने की प्रथा एक मुख्य कारण है ।

अध्ययन क्षेत्र में ओज़ोन की सांद्रता पर भी नज़र रखी गई और यह 8.81 से 49.13 µg/m3 पाई गई, जबकि शेष मापदंड (लेड, निकेल, आर्सेनिक, हाइड्रोजन सल्फाइड, नॉन मीथेन हाइड्रो कार्बन्स, मरकरी (Hg) और बेंजो (ए) पायरीन) में सभी पहचान योग्य सीमा से कम हैं।

जल की गुणवत्ता की निगरानी

अध्ययन क्षेत्र के भीतर विभिन्न स्रोतों से सतह और भूमिगत जल के नमूने एकत्र किए गए थे और परियोजना क्षेत्र के आसपास के पानी की गुणवत्ता स्थापित करने के लिए सभी महत्वपूर्ण भौतिक-रासायनिक तथा जैविक मापदंडों के लिए इनका विश्लेषण किया गया था। भूजल के लगभग 8 तथा सतही जल के 3 नमूने लिए गए थे।

भूजल का पीएच 6.58 से 7.27 और सतही जल का 6.85 से 7.79 है, भूजल का टीडीएस स्तर 464 से 2988 मिग्रा/ली., जबकि सतही जल का स्तर 274 से 326 मिग्रा/ली है। भूजल में क्लोराइड की सांद्रता 48 से 1085 मिग्रा/ली है, जबकि सतही जल में क्लोराइड की मात्रा 26 से 64 मिग्रा/ली के बीच है। भूजल की कठोरता 276 से 1120 मिग्रा/ली, जबकि सतही जल की कठोरता 116 से 180 मिग्रा/ली के बीच पाई गई।

शोर की निगरानी

अध्ययन क्षेत्र के 10 किमी के दायरे में कवर किए गए सभी 8 स्थानों पर दिन के शोर स्तर की निगरानी सुबह 6 बजे से रात 10 बजे और रात के शोर के स्तर को रात 10.00 बजे से सुबह 6.00 बजे तक की गई है। अध्ययन की अवधि के दौरान देखा गया कि अधिकतम स्तर दिन के समय 46.6 to 56.1 dB (A) दर्ज किया गया था और रात के समय 35.2 to 40.6 dB (A) दर्ज किया गया था। परिणामों से यह देखा जा सकता है कि दिन के बराबर मूल्य और रात के बराबर मूल्य आवासीय क्षेत्र के परिवेश शोर मानकों के भीतर थे।

मिट्टी की गुणवत्ता

मिट्टी की गुणवत्ता की परियोजना स्थल के अध्ययन क्षेत्र के भीतर 8 स्थानों पर जाँच की गई। नमूने का स्थान मिट्टी की मौजूदा स्थितियों के आकलन के लिए चुना गया था, जिससे विभिन्न जमीन के उपयोग की स्थिति और भौगोलिक विशेषताएँ प्रकट होती थीं। सभी नमूनों के महत्वपूर्ण भौतिक, रासायनिक मापदंड निर्धारित किए गए।

अध्ययन स्थल में पीएच मान 6.89 से 7.54 के बीच हैं, ऑर्गेनिक कार्बन की मात्रा 0.14 से 0.69% है, उपलब्ध नाइट्रोजन की मात्रा 144.9 से 340.2 किग्रा/हेक्टेयर हैं, तथा उपलब्ध पोटाशियम की मात्रा 126.92 से 179.55 किग्रा/हेक्टेयर हैं।

पारिस्थितिक पर्यावरण

बेसलाइन जानकारी उत्पन्न करने और जैविक पर्यावरण पर संभावित प्रभावों का मूल्यांकन करने के लिए मौजूदा वनस्पतियों और जीवों की पारिस्थितिक स्थिति को समझने के लिए क्षेत्र का जैविक अध्ययन किया गया है। असोला वन्यजीव अभयारण्य परियोजना स्थल से 300 मीटर पूर्वोत्तर दिशा में स्थित है।

प्रधान मुख्य वन संरक्षक और मुख्य वन्यजीव वार्डन, हरियाणा से एनओसी लेटर न 992 दिनांक 09 / 07 / 2019 को प्राप्त हुआ। यह प्रमाणित करते हुए कि यह परियोजना असोला भट्टी वन्यजीव अभयारण्य के परिभाषित पर्यावरण-संवेदनशील क्षेत्र से बाहर है। दिनांक: 31.05.2019 अधिसूचना के अनुसार। इसलिए, NBWL से मंजूरी परियोजना के लिए लागू नहीं है। एक विस्तृत साइट विशिष्ट संरक्षण योजना और वन्यजीव प्रबंधन योजना तैयार की गई और प्रधान मुख्य संरक्षक, वन और मुख्य वन्यजीव वार्डन, हरियाणा द्वारा मंजूरी प्राप्त की गयी। पत्र सं. 992 दिनांक: 09/07/19

सामाजिक-आर्थिक पर्यावरण

अध्ययन क्षेत्र की कुल जनसंख्या 153342 व्यक्ति है। जिसमें से 82571 (53.8%) पुरुष और 70771 (46.2%) महिलाएं हैं। अनुसूचित जाति की कुल आबादी 21848 है, जिसमें 11656 (53.4%) पुरुष और 10192 (46.6%) महिलाएं हैं।

साक्षरता दर एक देश में लोगों की राशि है जिसमें पढ़ने और लिखने की क्षमता है। साक्षरता के स्तर का विश्लेषण अध्ययन क्षेत्र में किया जाता है। किसी भी क्षेत्र में साक्षरता सामाजिक-आर्थिक प्रगति के लिए महत्वपूर्ण है और 2011 में भारतीय साक्षरता दर बढ़कर 74.04% हो गई।

प्रत्याशित पर्यावरणीय प्रभावों और शमन उपायों

प्रस्तावित परियोजना से पर्यावरण पर संभावित प्रभावों की पहचान न केवल परियोजना कार्यान्वयन और संचालन के साथ जुड़ी विभिन्न गतिविधियों की प्रकृति के आधार पर की जाती है, बल्कि परियोजना स्थल पर पर्यावरण गुणवत्ता की वर्तमान स्थिति पर भी की जाती है। प्रस्तावित परियोजना पर्यावरण पर दो चरणों में प्रभाव डाल सकती है।

- विकास के चरण में प्रभाव
- संचालन के चरण में प्रभाव

a) विकास के चरण में प्रभाव

विकास के चरण में साइट की सफाई, साइट का निर्माण, भवन निर्माण कार्य, बुनियादी संरचना के प्रावधान तथा अन्य किसी प्रकार की बुनियादी संरचना संबंधी गतिविधि शामिल है। प्रभाव सामान्यतः परियोजना क्षेत्र में सीमित रहता है तथा अनुमान किया जाता है कि इकाई की चारदीवारी के बाहर इसका प्रभाव नगण्य रहेगा। प्रभाव मुख्य रूप से वायु गुणवत्ता, जल की गुणवत्ता, मिट्टी की गुणवत्ता और सामाजिक-अर्थशास्त्र पर होगा। प्रभावों को कम करने के लिए सभी आवश्यक नियंत्रण उपाय किए जाएंगे। जैसा कि परियोजना स्थल पहले से ही परिचालन में है और अच्छी तरह से समतल करके बनाए रखा गया है और मोटी ग्रीन बेल्ट के साथ विकसित किया गया है, प्रस्तावित गतिविधियों के कारण धूल या अन्य प्रदूषण का कोई प्रभाव नहीं पड़ेगा।

b) ऑपरेशन चरण के दौरान प्रवाह के स्रोत
वायु गुणवत्ता पर प्रभाव

वायु प्रदूषण के मुख्य स्रोतों में भस्मक और डीजी सेट से बिंदु स्रोत उत्सर्जन के साथ-साथ लैंडफिल संचालन से उत्सर्जन शामिल हैं। पोस्ट प्रोजेक्ट परिदृश्य के आकलन के लिए, पार्टिकुलेट मैटर (पीएम), एसओ 2 और एनओएक्स के लिए 24- घंटे के औसत ग्राउंड लेवल कॉन्सेंट्रेशंस (जीएलसी) का अनुमान लगाया गया था और इसी आधारभूत अधिकतम सांद्रता पर आरोपित किया गया था। अधिकतम बेसलाइन सांद्रता पर अनुमानित सांद्रता के साथ समग्र परिदृश्य - 354.88 µg / m^3, SO2 - 20.64 µg / m^3, NOX - 76.7 µg / m^3.

इनसिनरेटर उत्सर्जन मानकों का पालन करने के लिए सभी आवश्यक फ्ल्यू गैस क्लीनिंग / प्यूरिफिकेशन सिस्टम (एफजीसीएस) से लैस किया जाएगा, जिसमें स्प्रे ड्रायर, एसएनसीआर सिस्टम, साइक्लोन, स्क्रबर, बैग फिल्टर आदि शामिल हैं। साथ ही इंसीनेरेटर 60 मीटर स्टैक ऊंचाई के साथ प्रदान किया जाएगा। डीजी सेट से उत्सर्जन कम से कम होगा क्योंकि वे केवल बिजली की विफलता के दौरान संचालित होंगे। उत्सर्जन को कम करने के लिए सभी वाहनों को नियमित रूप से servicing और रखरखाव किया जाएगा। डस्ट जनरेशन को कम करने के लिए सभी आंतरिक सड़कों को ठीक से बनाए रखा जाएगा। परियोजना सीमा के आसपास उचित वृक्षारोपण / ग्रीन कवर बनाए रखा जाएगा।

जल की गुणवत्ता पर प्रभाव

परिचालन चरण के दौरान, विशेष रूप से बारिश के दौरान लीचेट के भराव के कारण वहाँ के भूमिगत जल के प्रदूषण के लिए एक संभावित खतरा है। साइट पर श्रमिकों की घरेलू गतिविधियों से उत्पन्न सीवेज भूजल प्रदूषण का संभावित स्रोत हो सकता है अगर इसे ठीक से प्रबंधित न किया जाए । अनुशंसित प्रबंधन योजना के अनुसार, प्रदूषण की जांच के लिए परियोजना के परिचालन चरण में भूजल गुणवत्ता की नियमित अंतराल पर निगरानी की जाएगी।

भूमि पर्यावरण पर प्रभाव:

परियोजना के संचालन चरण के दौरान, विभिन्न प्रकार के नगरपालिका अपशिष्टों, कूड़े के रिसाव से और फ्लाई ऐश या निचले राख के कारण मिट्टी प्रदूषित / दूषित हो सकती है। साइट पर और उसके आस-पास की शीर्ष मिट्टी पर कोई महत्वपूर्ण प्रभाव होने की उम्मीद नहीं है। साइट पर एक अच्छी तरह से योजनाबद्ध ठोस अपशिष्ट संग्रह, भंडारण और अलगाव प्रणाली प्रबंधन स्थापित करना अनिवार्य है। केवल कवर किए गए ट्रकों को नगरपालिका के ठोस अपशिष्ट पदार्थों को उतारने के लिए साइट में प्रवेश करने की अनुमति दी जाएगी, अच्छी आवासीय व्यवस्था रखने से मिट्टी के प्रदूषण को नियंत्रित करने में मदद मिलेग।

पारिस्थितिकी पर प्रभाव

प्रस्तावित परियोजना की परिधि के साथ एक ग्रीन बेल्ट विकसित की जाएगी जो परियोजना की सीमा से शोर एवं गंध को प्रोजेक्ट साइट के बाहर तक पहुँचने को सीमित करेगी और छोटे पक्षियों और स्तनधारियों को आवास प्रदान करेगी; एप्रोच / सर्विस रोड के अलावा ग्रीनबेल्ट में कोई भी गतिविधियों की योजना नहीं बनाई जाएगी। कर्मचारियों को जंगली जानवरों के बारे में जानकारी होनी चाहिए। अध्ययन क्षेत्र में किसी भी अवैध शिकार और अवैध गतिविधियों की अनुमति नहीं होगी ।

सामाजिक आर्थिक जगत पर प्रभाव

प्रस्तावित सुविधा से प्रत्यक्ष और अप्रत्यक्ष रोजगार मिलने की संभावना है और अध्ययन क्षेत्र में आस-पास के गांवों की सामाजिक-आर्थिक स्थिति में वृद्धि की संभावना है। प्रस्तावित परियोजना के कारण सार्वजनिक परिवहन,

जल आपूर्ति, दूरसंचार, शिक्षा, सार्वजनिक स्वास्थ्य आदि की सुविधाओं में सुधार होने की संभावना है। प्रस्तावित सुविधा अच्छी अपशिष्ट हैंडलिंग प्रथाओं को प्रदान करती है जो दुर्गंध को कम करेगी और गंधों से प्रभाव को कम करेगी, इस प्रकार असंगठित निपटान के कारण पर्यावरणीय क्षति से बचा जा सकता है। स्वास्थ्य की स्थिति और अर्थव्यवस्था के संदर्भ में आस-पास के औद्योगिक सम्पदा में निवास स्थान बहुत लाभान्वित होते हैं।

पर्यावरण निगरानी कार्यक्रम

विस्तार इकाई स्थापित करने में शामिल प्रमुख निर्माण गतिविधियाँ जैसे उपचार इकाइयों, स्टोर्स आदि के लिए शेड का निर्माण हैं। प्रस्तावित संयंत्र में प्रमुख घटक लैंडफिल, वेस्ट टू एनर्जी, डीजल जनरेटर, FGCS, LTP कैथोड रे ट्यूब कटर और अन्य सिविल, यांत्रिक और बिजली के उपकरण। निर्माण गतिविधियों के लिए साइट की तैयारी, मौजूदा पुराने डंप की मरम्मत, निर्माण सामग्री और उपकरणों को जुटाना आवश्यक है। निर्माण गतिविधियों के कुछ महीनों तक चलने की उम्मीद है।

निर्माण चरण के दौरान लैंडफिल और डब्ल्यूटीई की निरंतर निगरानी की जाएगी। बेस तैयारी, लाइनर्स गुणवत्ता, जल निकासी परतें, लीचेट संग्रह प्रणाली, FGCS, स्टॉर्म जल प्रबंधन प्रणाली, गैस वेंट सिस्टम आदि

पर्यावरण निगरानी कार्यक्रम में शामिल: (i) भस्मक स्टैक से उत्सर्जित फ़्लुए गैस मापदंडों की निरंतर ऑनलाइन निगरानी, (ii) उत्सर्जन मानकों के अनुपालन को सुनिश्चित करने के लिए भस्मक स्टैक एमिशन मॉनिटरिंग, (iii) बोरवेल्स से पानी का सामयिक विश्लेषण (iv) परिवेशी वायु गुणवत्ता निगरानी, (v) उपचारित अपशिष्ट जल का विश्लेषण, विशेष रूप से निर्वहन के मामले में, (vi) समय-समय पर इंसीनेटर राख और कीचड़ की निगरानी आदि, (vii) अन्य मानकों के अनुसार ऑपरेशन (सीटीओ) आदि में निर्धारित।

पर्यावरण प्रबंधन योजना

प्रस्तावित परियोजना स्थल के क्षेत्र में सतत विकास सुनिश्चित करने के लिए पर्यावरण प्रबंधन योजना (ईएमपी) की आवश्यकता है। इसलिए, इन उद्देश्यों को पूरा करने के लिए उचित पर्यावरण प्रबंधन योजना (ईएमपी) की आवश्यकता है। पर्यावरण प्रबंधन योजना का उद्देश्य परियोजना से संभावित पर्यावरणीय प्रभावों को कम करना और प्रतिकूल प्रभावों को कम करना है। । कुल भूखंड क्षेत्र का न्यूनतम 33% CPCB दिशानिर्देशों के अनुसार ग्रीनबेल्ट के रूप में विकसित किया जाएगा। ईएमपी के कार्यान्वयन के लिए आवंटित बजट रुपये की आवर्ती लागत के साथ 2870 लाख रुपये है। 286 लाख प्रतिवर्ष। प्रस्तावित विस्तार सहित कुल परियोजना लागत रु. 617.01 Cr जिसमें IMSWM -WTE (15 MW) - 330.48 Cr और WTE के प्रस्तावित विस्तार के लिए लागत 25 MW- 286.53 Cr, अर्थात् 286.53 + 330.48 = 617.01 करोड़ शामिल है।

परियोजना के लाभ

प्रस्तावित परियोजना में रोजगार, सहायक कंपनियों के विकास, सेवा सुविधाओं की स्थापना, दूरसंचार और परिवहन सुविधाओं के विकास के रूप में प्रत्यक्ष और अप्रत्यक्ष आर्थिक लाभ होंगे। IMSWM से खाद उत्पादन CCA के अनुसार राज्य के राजस्व में वृद्धि करेगा और खाद फसल उत्पादकता और मिट्टी की बनावट में सुधार और मिट्टी के पोषक तत्वों के संवर्द्धन के परिणामस्वरूप मिट्टी की उर्वरता में वृद्धि होगी। कम्पोस्टिंग पैड से उत्पादित खाद का उपयोग मिट्टी के कंडीशनर के रूप में किया जा सकता है जो मिट्टी की गुणवत्ता में सुधार करता है। इस खाद में मिट्टी में पोषक तत्व की मात्रा में वृद्धि करके और नमी बनाए रखने के द्वारा खराब मिट्टी को पुनर्जीवित करने में मदद करने की क्षमता है।

निम्नलिखित लाभ: -

- फसलों के लिए खाद के रूप में उत्पादित खाद का उपयोग।
- एमएसडब्ल्यू प्रसंस्करण और निपटान सुविधा से उत्पादित खाद की बिक्री के माध्यम से राजस्व का सृजन।

निष्कर्ष

ईआईए अध्ययन ने नगर निगम गुरुग्राम के मौजूदा एकीकृत नगर ठोस अपशिष्ट प्रबंधन सुविधा में स्थापित होने वाले डब्ल्यूटीई संयंत्र के प्रस्तावित विस्तार (15 मेगावाट से 25 मेगावाट तक) संभावित पर्यावरणीय प्रभावों के बारे में समग्र मूल्यांकन किया है। विभिन्न पर्यावरणीय विशेषताओं के लिए बेसलाइन डेटा एकत्र किया गया था ताकि प्रस्तावित परियोजना के कारण उत्पन्न होने वाले प्रभावों की गणना की जा सके जिसमें वर्तमान IMSWM परियोजना गतिविधियों से उत्पन्न होने वाले उत्सर्जन शामिल हैं।

प्रस्तावित परियोजना से पर्यावरण पर संभावित प्रभावों की पहचान न केवल परियोजना कार्यान्वयन और संचालन के साथ जुड़े विभिन्न गतिविधियों की प्रकृति के आधार पर की जाती है, बल्कि परियोजना स्थल पर पर्यावरण गुणवत्ता की वर्तमान स्थिति पर भी की जाती है। पर्यावरण प्रबंधन योजना के रूप में परियोजना के कारण होने वाले प्रतिकूल प्रभावों को कम करने के लिए शमन उपाय प्रस्तावित हैं।

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